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ARMY RESEARCH AND DEVELOPMENT

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Army Science Conference Centered on Vietnam R&D Goals

Army Research Office Marks 10th Year

Ten years of growth in responsibility and authority for overall monitorship of Army basic research, including direction of certain areas of exploratory development, provided the occasion for U.S. Army Research Office employes to celebrate Mar. 20.

Chief of Research and Development Lt Gen Austin W. Betts and Deputy CRD Maj Gen Robert E. Coffin joined with Director of Army Research Brig Gen Charles D. Y. Ostrom Jr., a number of former leaders of Army research and employes in commemorating the tenth anniversary at a dinner dance in the Fort Myer (Va.) Officers Club.

Among the dignitaries in attendance was Col John A. Ord, director of the Army Research Office in 1957–58 when it was a small detachment at Fort Belvoir, Va. Col Ord (USA, Ret.) created the framework for establishment of the Army Research Office, effective Mar. 24, 1958, by order of then Secretary of the Army Wilber M. Brucker. Dr. Ord is now chief scientist, Foreign Science and Technology Center, Army Materiel Command.

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AR Prescribes Roles Of Project Managers

"Research and Development System/Project Management" is the title of a major revision of Army Regulation 70–17, dated Jan. 19, 1968, prescribing responsibilities and procedures.

Superseding AR 70–17, dated Nov. 22, 1965, the regulation provides for naming a project manager for each project of particular significance. This major change also details project manager functions and procedures, from an initial project charter through the transition to system support management.

When the development, production and support of a new materiel system will have a fundamental impact on the national interest or redirect basic national policy for an extended period, a Department of the Army system manager, in addition to the project manager, may be designated by the Secretary of the Army. A

(*Continued on page 11*)

Military materiel problem areas in the Vietnam War, as related to R&D responsiveness to requirements, will be keynoted by distinguished speakers and two panels of experts at the sixth Army Science Conference, June 18–21.

Maj Gen Donald V. Bennett, superintendent, will be host at the U.S. Military Academy, West Point, N.Y., where each of the five previous Army Science Conferences has been held.

Dr. William G. McMillan, scientific adviser to General William C. Westmoreland, CG, U.S. Army and U.S. Military Assistance Command Vietnam (MACV), will give the principal address. His remarks will be based upon his observations in Vietnam during the past 18 months.

Long recognized as one of the

(*Continued on page 3*)

Army-Sponsored Wind-Tunnel Research Paying Off

Army-sponsored basic research since 1963 on wind-tunnel testing of V/STOL aircraft is paying off with results that are "influencing significantly" U.S. Government and industrial design of tunnels and models.

Investigations by Prof. William H. Rae at the University of Washington have been supported through the U.S. Army Research Office-Durham (ARO-D), N.C., a field element of the Office of the Chief of Research and Development, Department of Army.

Dr. Sudhir Kumar, ARO-D associate director of the Engineering Sciences Division, reports that the project, "A Study of Operational Problems and Techniques in Wind Tunnel Testing of V/STOL (vertical, short takeoff and landing) Vehicles" has greatly improved the accuracy of test results.

Results of the continuing studies, he said, are leading to reevaluation of previous V/STOL and helicopter model test and design data. Changes

(*Continued on page 10*)

AFIP Breaks Ground for New Museum Building

Armed Forces Institute of Pathology, Washington, D.C. (See Story p. 5).

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Army R&D Newsmagazine

Vol. 9 No. 4 • April 1968

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Personnel Management for Research and Development

EDITOR'S NOTE: Dr. MacArthur, Deputy Director of Defense Research and Engineering (Research and Technology), gave the following address to a recent meeting of the Washington Section of the Society for Personnel Administration. He challenged Civilian Personnel administrators and the managers of R&D at all levels to work together more closely in using Civil Service rules and regulations to achieve mutually desirable goals.

★ ★ ★

I would like today to try identifying some of the problems and issues in the field of civilian personnel administration as they relate to Department of Defense (DoD) laboratories.

This is certainly not a new subject, but it is one that needs continuing attention at the highest level. In my job, I am concerned with the development of an effective in-house capability for research and technology. Consequently, the impact of personnel policies and practices upon the management of the Defense laboratories is of vital concern to me. I recognize that problems vary in intensity and character from lab to lab and from agency to agency, so there will always be some exceptions to the points I cover here.

First, what is the image of a technical career in the Federal Government as seen by industrial scientists and engineers? By and large, they see a lack of challenging work and initiative, too little recognition, with stifling bureaucracy and mountains of paperwork and red tape—in short, a career for people of marginal quality with little imagination and ambition, but the desire for lots of security. Right or wrong, this is the general image on the outside.

Second, what are my own observations since coming to the U.S. Government? Well, I found that there are many very bright people, but there are lots of marginal ones as well. Too often longevity appears to count more than achievement, and there is stagnation resulting from an inadequate supply of new blood for key R&D management positions.

Finally, R&D managers frequently do not have authority commensurate with their responsibilities. As a result of these factors, there does not appear to be an adequate system of incentives, rewards and penalties—which are absolutely fundamental to any dynamic and productive organization.

More specifically, I found that many of our in-house laboratories have not been heavily involved in the overall weapon-planning process, and too few have been involved in urgent military problems.

Third, they did not possess sufficient administrative flexibility to respond rapidly to changing needs,

Dr. Donald M. MacArthur

the changing state of technology, and the changing nature of new tasks. Thus, as already noted, they have responsibility without authority.

Such an environment is clearly not conducive to attracting the bright, ambitious, talented individual. You may well ask, "If that's the situation, what is R&D management doing about it?" In 1967, we instituted a high-priority program to minimize or eliminate these problems by:

- Assigning important military missions and weapon-planning responsibilities to laboratories.
- Reorganizing fragmented activities into more cohesive structures and centers with specific, challenging missions.
- Eliminating administrative problems that have inhibited the effectiveness of laboratories.

We have had some success with this program. The worst difficulty, of course, has been "people" problems, and we have been less successful in finding solutions for personnel problems than for the others. This, in fact, is the main thrust of my remarks today. Part of our problem may be one of attitudes and sociology, but much of the problem is the result of "the system."

You know, we can waste a great deal of time in trying to fix the blame for our inability to find more solutions to our personnel troubles. I feel that both R&D managers and personnel directors must share the blame. Now I realize there have been cases in which we had weak R&D managers where personnel people stepped in and did an effective job. There are also instances in which the opposite was true.

(*Continued on page 32*)

Army Science Conference Centered on Vietnam R&D Goals

(*Continued from page 1*)
nation's top scientists, Dr. McMillan has for the past 15 years served in a continuous succession of top-level Department of Defense, Department of the Air Force and Defense Industry Association study and ad hoc groups. He has been a member of the President's Scientific Advisory Committee since 1960.

More than 400 of the U.S. Army's leading scientists, along with representatives of the United Kingdom, Canada and Australia (as members of the ABCA Quadripartite Army Group on weapons standardization), will participate.

Ninety-six technical papers, selected from nearly 500 narrative proposals submitted by in-house scientists in all Army R&D activities, will represent efforts of 196 authors and coauthors.

Certificates of Achievement and cash prizes will give recognition to about 20 papers selected by a panel of judges. Prizes totaling $4,100 were awarded at the 1966 Army Science Conference through the Incentive Awards Program, under which military scientists now can win cash honorariums on the same basis as civilian employes.

One of the 1966 conference highlights was a discussion of "Basic Research and Practical Relevancy." Involved in a 4-hour panel discussion sparked by controversial viewpoints were eight eminent leaders representative of the Department of Defense, industry, academic institutions and the general public.

The innovation was such an outstanding success that it is being continued this year with two panels. One will be concerned with the U.S. pacification program in South Vietnam. The other panel will consider survivability and casualty evacuation, with special reference to the use of the U.S. Army's dramatically new field hospital system in Vietnam, the Army Medical Unit Self Transportable (MUST).

Dr. Kenneth Edwin Clark, dean of the College of Arts and Sciences at the University of Rochester in New York, will monitor the pacification panel.

Exchanging civilian viewpoints with him will be Dr. Ithiel de Sola Pool, professor of political science, Center for International Studies, Massachusetts Institute of Technology, and Dr. Michael Conley, Center for Research in the Social Sciences, American University, Washington, D.C., an Army contract agency.

Military members of the panel are Brig Gen William R. Desobry, deputy director, Plans, Office of the Deputy Chief of Staff for Operations; Lt Col Thomas M. Huddleston, chief, Special Operations Division, International and Civil Affairs Directorate, DCSOPS; and Lt Col Guy S. Melloy, Far East Branch, Politico-Military Division, DCSOPS.

Discussion will deal with "The Nature of Village Life in Vietnam," "The Village Evaluation System,"

(*Continued on page 4*)

ASAP Slates Nonnuclear Munitions Meeting

Army Scientific Advisory Panel members and senior consultants have set "More Effective Munitions for Nonnuclear War" as the theme of their spring meeting at HQ U.S. Army Munitions Command, Picatinny Arsenal, Dover, N.J., May 19–21.

Joining in the discussion of three main areas of consideration—terminal effects-antipersonnel munitions, fuzing and rifles—will be about 20 dignitaries from the Department of Defense and the three Military Departments. Members of the MUCOM Scientific Advisory Group also will participate.

Maj Gen Frank G. White, MUCOM CG, will be host for the meeting.

Assistant Secretary of the Army (R&D) Dr. Russell D. O'Neal; Chief of Research and Development Lt Gen A. W. Betts; General Frank S. Besson Jr., CG of the U.S. Army Materiel Command, and Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command, are scheduled to attend.

Other members of the ASAP Executive Committee who will take part are Dr. Harold M. Agnew, ASAP chairman; Dean Ralph E. Fadum, ASAP vice chairman; and Lt Col Wayne D. Miller, who recently succeeded Col Joseph E. Fix III as executive secretary.

SWEARING-IN CEREMONIES during the Army Scientific Advisory Panel (ASAP) winter meeting at the U.S. Army Missile Command, Redstone Arsenal, Ala., added two new members and eight consultants. Former ASAP executive secretary, Col Joseph E. Fix III, (left) swears in new member Burton P. Brown Jr., General Electric Co., Syracuse, N.Y. From top left are: new member Dr. Richard A Montgomery, Boeing Co.; consultants Dr. James B. Angell, Stanford University, Dr. Paul F. Chenea, General Motors Technical Center (Warren, Mich.), Prof. Enoch J. Durbin, Ames Research Center (Moffett Field, Calif.), Dr. David L. Fired, North American Rockwell Corp., Jack I. Hope, Cummins Engine Co., Inc., Dr. James J. Renier, Honeywell, Inc., Charles H. Zimmerman, scientific consultant and adviser, Hampton, Va.

ASC Centered on Vietnam R&D Goals

(*Continued from page 3*)

"The Values and Attitudes of Vietnamese Villagers," and the "Security of the Village in Vietnam."

Maj Gen Joe Blumberg, CG of the U.S. Army Medical Research and Development Command, has accepted an invitation to chair the medical panel.

Members are Brig Gen James A. Wier, CG of William Beaumont General Hospital, El Paso, Tex., formerly surgeon of the U.S. Army in Vietnam; Col William D. Tigertt, commander and director of Walter Reed Army Institute of Research (WRAIR), Washington, D.C.; and Lt Col John J. Kovaric, deputy director of the WRAIR Division of Surgery.

An innovation this year will be a one-hour comprehensive briefing on Army Research and Development by Lt Gen Austin W. Betts, Chief of R&D.

Dr. Marvin E. Lasser, Army Chief Scientist, is listed to serve as presiding chairman of the conference. He also is chairman of the panel of judges to select the award-winning technical papers. Dr. Russell D. O'Neal, Assistant Secretary of the Army for Research and Development, is programed to present the awards.

Selection of the banquet speaker had not been announced at press time. Based upon his lively performance in the role at four previous Army Science Conferences, Dr. Ralph G. H. Siu's return as toastmaster will contribute much to the enjoyment of conferees and their ladies. Dr. Siu is director, Plans, Development Directorate, Headquarters Army Materiel Command.

Deputy and Scientific Director of Army Research Dr. Richard A. Weiss is general chairman, a role he has filled for each of the previous Army Science Conferences. Dr. John Hayes, chief of the Army Research Office Programs and Concepts Branch, is project officer.

Director of Army Research Brig Gen Charles D.Y. Ostrom Jr. will introduce Dr. McMillan as the keynote speaker on the opening day. Maj Gen Bennett, as host at the academy, will give the address of welcome.

Serving with Dr. Lasser on the panel of judges are Dean Ralph E. Fadum, School of Engineering, North Carolina State University; Donald G. Fink, general manager, Institute of Electrical and Electronic Engineers; Dr. Paul M. Gross, Department of Chemistry, Duke University; Dr. Walter J. Nungester, chairman, Department of Bacteriology, University of Michigan Medical School; and Dr. Vincent S. Haneman Jr., director of Engineering Research, Oklahoma State University; and Dr. A. R. Curreri, chairman, Department of Surgery, and director of the Division of Clinical Oncology, University of Wisconsin Medical Center.

The conference is organized into four technical sessions, each with six subsessions, with chairmen designated as follows: Session A, Dr. Craig M. Crenshaw, chief scientist, Army Materiel Command; Session B, Dr. I. R. Hershner, chief, Physical and Engineering Sciences Division (P&ESD), Office of the Chief of R&D (OCRD); Session C, Dr. Gilford G. Quarles, chief scientific adviser, Office of the Chief of Engineers (OCE); Session D, Col Paul E. Teschan, director, Division of Surgery, WRAIR.

Subsession A–1—Dr. Robert B. Watson, P&ESD, OCRD; A–2, Paul Yaggy, technical directory, Aeronautical Research Laboratory, Moffett Field, Calif.; A–3, Dr. Colin Hudson, chief scientist, Army Weapons Command; A–4, Col P. J. Kenny, director, Communications Automatic Data Processing Laboratory, Army Electronics Command (ECOM); A–5, Dr. J. W. Dawson, chief scientist, Army Research Office, Durham, N.C.; A–6, J. C. Ackerman, chief, Development Engineering Division, Army Limited War Laboratory, Aberdeen Proving Ground, Md.

Subsession B–1—Aldred Rogers, chief engineer, ECOM; B–2, Dr. J. V. R. Kaufman, chief scientist, Army Munitions Command (MUCOM); B–3, Lewis Gober, chief engineer, Mobility Equipment Command; B–4, Billy M. Horton, technical director, Harry Diamond Laboratories; B–5, Benjamin S. Goodwin, special assistant, Test and Evaluation Command; B–6, Dr. Robert Eichelberger, technical director, Army Ballistic Research Laboratories.

Subsession C–1—Leonard Ambrosini, chief systems engineer, Army Weapons Command; C–2, James P. Sale, chief, Military Engineering Research, OCE; C–3, Horace Lowers, chief engineer, Army Missile Command; C–4, Robert Schwartz, chief engineer, MUCOM; C–5, Robert F. Jackson, research coordinator, OCE.

Subsession D–1—Dale Sieling, scientific director, Army Natick Laboratories; D–2, Dr. John Weisz, technical director, Human Engineering Laboratory, Aberdeen Proving Ground, Md.; D–3, Dr. Van Sim, deputy director, Medical Research, Edgewood Arsenal, Md.; D–4, Dr. Charles Reynolds, technical director, Edgewood Arsenal; D–5, Col Donald L. Howie, chief, Life Sciences Division, OCRD; D–6, Lt Col John J. Kovaric, deputy director, Division of Surgery, WRAIR.

Civil Defense R&D Improves Shelter Ventilator

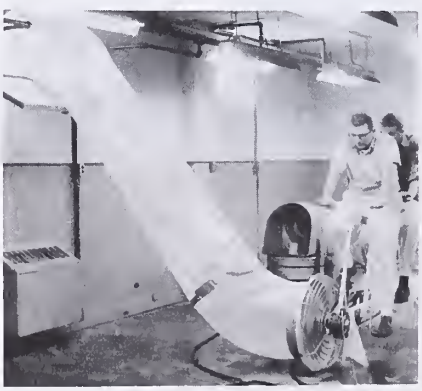
Research and development contributions to the National Civil Defense Program, for which the Army is assigned overall responsibility, include a new ventilation kit that could potentially provide millions of additional fallout shelter spaces.

The Office of Civil Defense (OCD) announced a pilot procurement program with distribution of 2,246 of the experimental ventilation kits to the 57 cities where the community shelter planning program was originally tested prior to its present wider deployment.

The kits were supplied where the number of shelter spaces were restricted by inadequate ventilation. The pilot program provided 201,599 additional shelter spaces at an average cost of $1.98 per space.

Packaged in two units, the ventilation kit may be operated manually or electrically. One unit consists of an exhaust fan assembly with a stand, duct-adapter for reaching distant windows and accessories. A drive module with saddle, pedals, chain and handlebar comes in the second unit. In the absence of electricity, the ventilator fan is operated bicycle-fashion. Fresh air enters the shelter through various distant openings. This intake air is not contaminated by fallout particles due to low entrance velocities.

The ventilation kits were developed by General American Research Division, General American Transportation Corp. Robert G. Hahl of the OCD Shelter Research Division monitored the developmental program. Procurement and distribution were accomplished by the Defense Supply Agency.



VENTILATION KIT (2-operator) window assembly for basement shelter.

Armed Forces Institute of Pathology Breaks Ground for Museum

One of the world's great and truly unique establishments, the Medical Museum of the Armed Forces Institute of Pathology in Washington, D.C., will move into a new $7.5 million building at Walter Reed Army Medical Center in the spring of 1970.

Groundbreaking ceremonies for the new wing, on the south side of the AFIP, were held Mar. 22. Construction was scheduled to begin as this publication went to press. The 7-story addition will have a full basement and will be the largest structure erected at Walter Reed since the main building was occupied in 1955.

The historic and architecturally interesting AFIP Medical Museum building, which has stood on Washington's Mall at 7th Street and Independence Ave., S.W., since 1887, will be torn down and replaced by an ultramodern building—the new Hirschhorn Art Museum.

Designed by the architectural firm of Edward Durell Stone of New York City, the new home of the AFIP Medical Museum will, since it will have windows, end the institute's status as the only atomic-blast-proof building in the Washington area.

The building will include the latest in research laboratory concepts, with 46 laboratories designed individually for negative and positive pressures, temperature, and humidity control.

All laboratories will be linked by an intercom system which automatically adjusts volume according to the level of noise in each room.

Each office and laboratory is to be equipped for eventual direct contact with the AFIP computer, which can make 7,000 reference cases available in one day to a pathologist.

The AFIP Medical Museum is the only museum of its kind in the United States, and is without parallel elsewhere in the world. Visited by 765,000 persons during 1967, it has had an estimated 12 million viewers of its exhibits since it was founded in 1862.

Another unique aspect of the Medical Museum wing will be the only wound-ballistics experimentation complex at any U.S. medical facility. Housed in the basement, three laboratories will be complemented by an armory, control room, firing line, instrument room, facilities for high-speed photography, X-ray and projectile velocity analysis.

The firing line will handle weapons up to .50-caliber, mounted on tracks to enable placement by researchers at appropriate distances from targets, which will be gelatin blocks or gross tissue specimens. The complex will have a strict security and safety system.

Attractions for visitors will be displayed to much better advantage in the new structure. The first floor of the museum will have such new features as an audio-visual complex devoted to each system of the body, and an enlarged section of the medical archives.

What is believed to be the world's largest collection of historic microscopes also will be displayed on the first floor. The exhibit, "Evolution of the Microscope," features instruments dating from the early specimens of the 17th Century.

Sixteen study rooms will be located on the second floor. Each is to be devoted to a particular discipline of pathology and equipped with display material, literature and specimens. Visiting scientists will be able to study many exotic diseases and tissue reaction to injury. This floor will have lecture rooms, specimen storage rooms, and a professional exhibit area.

Beginning at the third floor level, a laboratory tower will provide connection to the main building by a corridor. On this floor will be laboratories for military environmental pathology, accident pathology, legal medicine, facilities for the Veterans Administration and the U.S. Public Health Service and law library.

The fourth floor will accommodate facilities for studies of ear, nose and throat ailments or injuries, the Registries of Tissues Reaction to Drugs and Noteworthy Research, a biomedical materials exchange and 10 related labs.

Fifth floor researchers will be concerned with geographic zoonoses, mapping of diseases, electron microscopy, Mycobacterial investigations, and research in muscular disorders.

Housed on the sixth floor will be the Geographic Pathology and Infectious Diseases Branch and related laboratories. Four labs will be designed and equipped for sterile transfer. Researchers, shielded by hoods, will work with exotic organisms.

To assure noncontamination of the rest of the building, the seventh floor will have a self-contained ventilating system and a special exit-and-entry system, for high-hazard biological research. Facilities, under supervision of the Veterinary Pathology Division, will include three bio-experimentation rooms, a necropsy room and other labs.

The Armed Forces Institute of Pathology is the nation's leading laboratory of pathology, serving the federal medical services and the civilian medical profession through the American Registry of Pathology.

U.S.-Canadian Materiel Effort Studied at N-Labs

Canadian Department of National Defence and Defence Research Board representatives met with U.S. Army Natick (Mass.) Laboratories scientists and technologists during a recent 3-day visit to discuss areas of mutual concern in support of the combat soldier of both nations.

Specific interests of the 11 civilian and military visitors included work at Natick on individual clothing and equipment, organic materials, food and packaging, tentage and allied equipment, rubber and plastics, chemical research, heat stress CW clothing and equipment, and use of the solar furnace.

Department of National Defence visitors included G. T. Holmes, Directorate of Clothing and General Engineering (DCGE); Maj F. J. Casey, Materials, Packaging and Food Section, DCGE; K. W. L. Kenchington, head, Textiles, Clothing and Footwear Section, DCGE; W. E. Victor, Field Survival and Tent Equipment, DCGE; Lt Col L. W. Basham, coordinator, Operational Technical Investigations; and Capt T. C. White, Directorate, Land Forces Operational Requirements/Land.

Defence Research Board members included W. E. Cowie, director, Development "D" Division; H. L. Nash, head of the Rubber and Plastics Group; Dr. A. C. Custance, head of the Human Engineering Group; J. A. Hart, head of the Barrier Materials Group, J. A. Wheat, section head of the Pilot Plant Chemical Engineering. All are assigned to the Defence Chemical, Bacteriological and Radiological Establishment.

Two members of the U.S. Army Standardization Group-Canada, assigned to Canadian Forces Headquarters in Ottawa, Ontario, accompanied the Canadians. They are Lt Col J. F. Reidy, assistant senior standardization representative, and Lt Col J. M. Chaffin, general materiel and airborne equipment representative, who coordinated the visit to Natick.

Assistant Secretaries of the Army (R&D)

Richard S. Morse
(*1959–1961*)

Finn J. Larsen
(*1961–1963*)

Willis M. Hawkins
(*1963–1966*)

Russell D. O'Neal
(*1966–*)

Army Research Office Marks 10th Year

(*Continued from page 1*)

General Order No. 22, issued June 23, 1958, relocated the Army Research Office at Arlington Hall Station, Arlington, Va., with an authorization of 26 officers and 59 civilians.

In June 1962, when the Army-wide reorganization was in progress, the office was moved to its present location in the Highland Building, 3045 Columbia Pike, Arlington, Va. 22204. Organized presently into 10 divisions and separate offices, USARO is staffed with 43 officers, 3 enlisted men and 106 civilian employes.

One of the highlights of the anniversary party was the presentation of a commemorative wall plaque on behalf of Rear Adm Thomas B. Owen, Chief of Naval Research. The presentation was made by Chief Scientist Dr. Peter King, Office of Naval Research.

Present for the anniversary were Maj Gen Chester W. Clark (USA, Ret.) the third Director of Army Research (1962–63), vice president of Research Triangle, Inc., Durham, N.C.; Col Robert E. Kimball (USA, Ret.), DAR from 1965 to 1967, USARO commanding officer (1958–59) and now senior engineering physicist with Hazelton Laboratories, Falls Church, Va.; and Brig Gen William W. Stone, USARO executive (1958–59), now deputy to Dr. Jay Tol Thomas, Army Materiel Command Deputy for Research and Laboratories.

Host for the occasion was Col William J. Lynch, Assistant Director of Army Research and commanding officer of the Army Research Office.

When the Army Research Office was relocated in the Highland Building, the additional space permitted consolidation of headquarters elements. Brig Gen Ostrom, like his predecessors, also maintains offices in the Pentagon to facilitate coordination with other directorates of the Office of the Chief of Research and Development.

The U.S. Army Research Office-Durham (ARO-D), N.C., operates as a major field element of the Office of the Chief of Research and Development and is responsible directly to the Director of Army Research. ARO-D was established Jan. 16, 1961, upon recommendation of the Roderick Board, as the successor to the Office of Ordnance Research.

To broaden the research base for the utilization of specialized skills of leading scientists in Europe, the Army Research Office has been responsible for operations of the U.S. Army R&D Group (Europe) for 10 years. The unit was established at Frankfort, Germany, in April 1956. Brig Gen Ostrom was one of the early chiefs. Col Robert B. Bennett is the present CO.

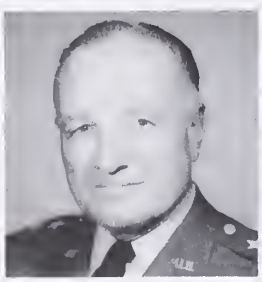
Establishment of the U.S. Army R&D Group (Japan) was approved by the Assistant Secretary of the Army, Nov. 25, 1958, and it was changed to the U.S. Army Far East Research Office, Camp Zama, Japan, in March 1959. Its present designation is U.S. Army R&D Group (Far East). Commanded by Col Charles W. Cook, it is concerned primarily with research in the life sciences.

In coordination with the U.S. State Department, Department of Defense and other major U.S. Government agencies, the U.S. Army Element of the Defense Science (since changed to Research) Office, Latin America, was established Aug. 1, 1962, in Rio de Janeiro, Brazil. Commanded by Col Hugh L. Keegan, it coordinates U.S. Army research interests with leading Latin American scientists.

The Army Research Office also monitors activities of the U.S. Army Behavioral Sciences Research Laboratory (BESRL), formerly the Army Personnel Research Office, located in Building Tempo A, Wash-

Chiefs of Research and Development

Lt Gen J. M. Gavin
(*1955–1958*)



Lt Gen A. G. Trudeau
(*1958–1962*)

Lt Gen D. E. Beach
(*1962–1963*)

Lt Gen W. W. Dick
(*1963–1966*)

Lt Gen A. W. Betts
(*1966–*)

ington, D.C. BESRL is a major research facility, staffed with 10 officers and 105 civilian employes, 64 of whom are professional scientists. Col Marshall O. Becker is the commander.

When the U.S. Army Research Office was established, Lt Gen Arthur G. Trudeau, now retired and president of Gulf R&D Co., was taking over as Chief of Research and Development. Actually, Lt Gen James M. Gavin retired Mar. 31. Brig Gen Theodore J. Conway was the first Director of Army Research. Now wearing four stars, he is Commander-in-Chief of Strike Command and CIC, Middle East/Southern Asia and Africa.

Only 12 of the original USARO employes remain: Dr. Richard A. Weiss, Deputy and Scientific Director, and his secretary, Mrs. Ralph (Cora) Watson; Dr. Paul A. Siple, scientific adviser; Dr. Lynn E. Baker, Army chief psychologist; Dr. Ivan R. Hershner Jr., chief, Physical and Engineering Sciences Division; and

Dr. Leonard S. Wilson, chief, Environmental Sciences Division; Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, ES Division; James E. (Sonny) Williams, driver; Mrs. Harriet B. Doyle, contracts specialist; Miss Mary K. Williams, secretary to the Director of Army Research; Mrs. Charles (Frances) Belles, chief clerk, Scientific and Technical Information Division; and Miss Lucy Taylor, secretary, Social Sciences Branch, Behavioral Sciences Division.

Various organizational realignments have been effected within the Army Research Office over the years, but the original mission statement is substantially the same:

"To plan and direct the research program of the Army to insure maximum utilization of the available scientific talent, and to insure a dynamic program responsive to the future requirements of the Army;

"To foster within the laboratories and arsenals of the Army the best possible atmosphere for the prosecution of research;

"To provide the scientific community with a point of contact or entry into the Army research community; and

"To encourage and promote scientific training and education and to further civilian scientific activity in areas of possible interest to the Army."

The Army Research Office was created to coordinate Army-wide administration of research by centralized planning and decentralized execution of research programs. A specific function was to insure coordination of research planning and review with the Air Force, Navy and other U.S. Government agencies.

Directors of Army Research

Lt Gen T. J. Conway
(1958–1959)

Lt Gen W. J. Ely
(1959–1962)

Maj Gen C. W. Clark
(1962–1963)

Maj Gen W. W. Lotz
(1963–1965)

Col R. E. Kimball
(1965–1967)

Brig Gen C. D. Y. Ostrom Jr.
(1967–)

Substantial progress in pursuance of these objectives has been achieved in 10 years. Much of that progress, excluding those projects of a classified nature, has been reported in the pages of the *Army Research and Development Newsmagazine*. Established in December 1960, it is distributed worldwide to U.S. Army and other U.S. Government agencies, currently averaging about 51,000 copies monthly.

Magnitude and the broad diversification of the Army research program, reaching into all the major disciplines and more than 75 subareas, are reflected by the DA Form 1498 (Research and Technology Resume) automatic data reporting system. Current figures reflect over 7,000 ongoing work units.

P&ES DIVISION. In order of the total money spent for basic research and exploratory development activities, the Physical and Engineering Sciences Division ranks first among headquarters elements of the Army Research Office.

Headed by Dr. I. R. Hershner, the P&ES Division consists of an Energy Conversion Branch (Dr. Sidney J. Magram, chief), Mathematics Branch (Fred Frishman, chief) and a Physics, Electronics and Mechanics Branch (Dr. Robert B. Watson, chief).

The P&ES Division has the primary responsibility for staff supervision of research programs in physics, nuclear physics, mechanics, electronics, chemistry, mathematics, materials, energy conversion and allied areas of engineering. It also exercises staff supervision of exploratory development programs in electrical power, electronic devices, automatic data processing, surveillance and target acquisition, aeronautical engineering, ballistics, materials, explosives and propellants.

Responsibilities of the P&ES Division include functioning as the technical contact at General Staff level for the Assistant Secretary of the Army (R&D), the Director of Defense Research and Engineering, and other staff agencies in matters pertaining to the Army physical and engineering sciences program. Division personnel participate in formulation of plans and programs in assigned areas, and supervise the program of the Army Research Office-Durham, N.C., for the Director of Army Research.

Coordination activities of the P&ES Division include providing membership on the Laser Advisory Group; Special Group on Optical Masers; Advisory Group on Electron Devices; Technical Advisory Committees for Joint Services Electronics Program; and Advisory Group to the Lincoln Laboratory.

Since June 1960, the division has furnished the chairman and executive

(Continued on page 8)

Dr. R. A. Weiss

Col W. J. Lynch

Dr. P. A. Siple

Army Research Office Marks 10th Year

(*Continued from page 7*)

secretary of the Army Mathematics Steering Committee; Army member since 1960 and chairman (1961, 1963 and 1967) of the Joint Services Advisory Group for Research in Applied Mathematics and Statistics; Army member since 1960 of the Department of Defense Liaison Group for Research in Statistical Quality Control and Reliability; and the Army member since 1960 of the Interagency Group for Research in Information Systems.

Internationally, members of the P&ES Division participate through membership and presentation of papers in Technical Tripartite Cooperation Program groups in aircraft, aero-engines, electron devices, infrared, lasers, interior ballistics, exterior ballistics, explosives, propellants, metallic materials, inorganic and nonmetallic materials, organic materials, and methods of test and evaluation of materials.

In addition, P&ES personnel participate in the NATO Advisory Group Air Research and Development Structures and Materials Panel, the Defense Research Group Subpanel on Far Infrared, and the U.S.-United Kingdom Cooperative Program in Laser Weaponry and Fuel Cell Research.

The list of accomplishments compiled by the P&ES Division over the past decade is impressive—and too long for complete enumeration here.

The Materials Advisory Committee (MAC) formed by the division became the Army Materiel Command (AMC)/MAC when the Army was reorganized in 1962. Organization and planning for aeronautical research at AMC and ARO-D was initiated. Assistance was given in forming the Army Ames Aeronautical Research Laboratory and in formulating the NASA-Ames agreement on an aeronautical program.

Division scientists produced a 5-year plan for combat surveillance and target acquisition, using input from the AMC. Nuclear physics projects were initiated, and through membership in the Interagency Fluidic Coordination Group an Army research program in fluidics was developed.

Assistance was given to organizational planning and establishment of ARO-D. The P&ES Division also provided Army representation to initiate the Interagency Advanced Power Group (Army, Navy, Air Force, AEC, NASA) coordination group on energy conversion programs.

Reports of far-reaching impact were prepared on fuel cells (first and second status reviews), ground effects machines, and machine translation of languages.

LIFE SCIENCES DIVISION. Col Donald L. Howie recently succeeded Col Tyron E. Huber, who had served as chief of the LS Division since 1960. Dr. Carl Lamanna is deputy and scientific adviser, a position he has filled since September 1961.

Lt Col Thomas R. Ostrom is chief of the Medical and Biological Sciences Branch; Dr. Allan L. Forbes (currently attending the National War College) is chief of the Scientific Analysis Branch; and Dr. Eugene Sporn heads the Special Projects Branch.

As stated in OCRD Regulation No. 10–24, the mission of the division is to supervise the research, development, test and evaluation program of the Army Medical Service; the life sciences research and exploratory development programs of the Army Materiel Command; and projects received from other U.S. Government agencies.

The division provides technical contact at General Staff level for ASA (R&D), DDR&E, and major commands and agencies in matters pertaining to the Department of the Army life sciences program.

Charged with stimulating and supporting science and technology in the medical and biological sciences, the division monitors and supervises the Army-wide program in basic research in the life sciences; also, participates in formulating plans and programs in assigned areas.

Activities of the Life Sciences Division over the past 10 years, in conjunction with the U.S. Army Medical Service, have ranged into many nations worldwide. Only a few of the more significant achievements can be cited as indicative of the broad overall effort.

Antimalaria Drug Program. In consideration of the Vietnam War, one of the major successes has been the antimalaria drug program conducted through the U.S. Army Medical R&D Command. A new antimalaria tablet containing chloroquine and primaquine was developed after research on thousands of compounds. Chloroquine serves as a suppressant of the disease and primaquine effects a permanent cure in most cases.

The tablet was first provided to troops in Korea in 1961. In certain

Dr. L. S. Wilson

Col D. L. Howie

Col D. L. Vincent

Col C. E. Preble Jr.

Dr. I. R. Hershner Jr.

Col R. D. McGovern

Lt Col R. H. Hurst

Col A. E. Joy

Lt Col C. E. Ramsburg

Capt A. W. Reed

areas of the world, such as South Vietnam, a few cases of chloroquine-resistant falciparum malaria and vivac malaria have developed. Dapsone (DDS), developed in 1948 for treatment of leprosy, was found to be an excellent treatment for the chloroquine-resistant malaria. Used in conjunction with the chloroquine-primaquine tablet, it is now an authorized method of treatment.

U.S. Army-SEATO Lab. The U.S. Army-SEATO Medical Research Laboratory was established in Bangkok, Thailand, in 1961 as the first laboratory of its kind. It was organized at the request of the Thai government as a result of a 1958 cholera epidemic.

Operated as a special activity of Walter Reed Army Institute of Research, Washington, D.C., the laboratory conducts a continuing study of infectious diseases of the area. Included are cholera, malaria, typhoid, dengue fever, hookworm disease, scrub typhus and filariasis.

Artificial Heart Pump. Pioneering work in fluidics at the Harry Diamond Laboratories, one of the Army's major research facilities located in Washington, D.C., led to the development of an artificial heart pump in 1961. Continuing developmental effort has been conducted with Walter Reed Army Institute of Research. Some support has come from the National Institutes of Health in recent years.

Successive improvements have reduced weight of the artificial heart pump by use of better materials from 10.5 to 5.75 pounds. Modifications will continue until the device can be used in the field to keep wounded soldiers alive in remote areas during critical hours after injury. In the meantime, the easily transportable pump can be used to great advantage in military and civilian hospitals.

Defense Research Office—Latin America—The Life Sciences Division monitors and was largely responsible for the development of the program of research conducted through the U.S. Army Element of the Defense Research Office in Latin America. The request to establish the office was made by the Chief of Research and Development.

The result was organization of a U.S. Science Mission to Brazil, Uruguay and Argentina in 1959. High-ranking officials of the National Science Foundation, National Academy of Sciences, U.S. Atomic Energy Commission, Department of Defense and the Department of the Army surveyed the potential for research. The resulting report was prepared and published by the U.S. Army Research Office.

The Director of Defense Research and Engineering assigned to the U.S. Army Research Office executive agency responsibility for the Defense Research Office in Rio de Janeiro, Brazil.

One of the most important efforts, insofar as worldwide impact is concerned, was the preparation, in 1962, of the U.S. Army Medical Service 5-Year Research, Development, Test and Evaluation Program to meet forecasted requirements for any kind of war in any environment.

This program was the result of a year of intensive high-level coordinated planning between Army General Staff agencies, the Army Technical Services, U.S. Government and nongovernment agencies sponsoring medical research. The Armed Forces Epidemiological Board, the Navy Scientific Advisory Panel and other agencies, notably the Ad Hoc Medical-Biological Committee of the Army Scientific Advisory Panel, contributed to the program.

Five-Year Program. Prospects of limited and special warfare supplied the impetus for development of the 5-year program, which provided for increased efforts in 15 RDT&E project areas.

Major emphasis was on preventive medicine, combat surgery, military internal medicine, military psychiatry, development of new and improved air-droppable and transportable medical and surgical field equipment and supplies, studies of ionizing radiation injury, military environmental medicine, and basic research in life sciences.

The 5-year program has since been updated and will be revised as necessary in view of anticipated long-range medical research requirements.

Aeromedical Research. Another important advance was the establishment of an Aeromedical Research Unit (ARU) in July 1962, at Fort Rucker, Ala., to meet a need for specialized knowledge linked to expansion of Army aviation.

Directed by The Surgeon General through the Army Medical R&D Command, ARU's function is to provide central consultative service to flight surgeons in support of all Army aviation requirements.

Research is oriented primarily to Army aviation objectives with respect to psychological and physiological fitness of aircrew members, their training and equipment.

ARU activities are coordinated closely with the Civil Aeromedical Research Institute, the Federal Aviation Agency, U.S. Air Force, U.S. Navy and other governmental agencies to minimize overlapping efforts.

German Measles Discovery. German measles has long been known worldwide as one of the great cripplers of unborn children. Consequently, it was big news when, in 1962, isolation of the causative virus of the disease, laying the foundation for development of a vaccine, was announced simultaneously by scientists at Walter Reed Army Institute of Research (WRAIR), and the Harvard School of Public Health. Research, however, was conducted independently by the two laboratory groups.

Rubella, the scientific term for the disease, frequently causes deafness, blindness and heart disease in the unborn child. However, it also is a serious problem for the military services in that it may occur at times in epidemic proportions, particularly among recruits.

Significant contributions to the understanding and control of food poisoning were made by Army in-house laboratory researchers in 1966.

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Army-Sponsored Wind-Tunnel Research Paying Off

(*Continued from page 1*)

are being generated in future aircraft designs and a number of foreign aeronautical firms haves expressed interest in the findings.

Incurred and anticipated expenditures on aircraft and associated wind-tunnel facilities influenced by this research, he said, "would easily amount to several hundred million dollars."

Research conducted by Prof. Rae is one of the projects of the ARO-D Military Themes Program. It is listed as "Aeronautical Studies to Improve Operations Associated with Subsonic Aircraft and Hovering-Type Vehicles." Investigations have been continuous for five years.

Prof. Rae's research on the influence of walls and rotor size on V/STOL wind-tunnel tests is concerned primarily with experimental analysis. It is tied to an early theory proposed by Harry H. Heyson, an aeronautical engineer with the National Aeronautical and Space Administration at Langley Research Center, near Fort Eustis, Va.

In a report prepared for the *Army Research and Development Newsmagazine*, Dr. Kumar states in part:

"Wind-tunnel testing of scale models is an established practice in the research and design of conventional fixed-wing aircraft. The tests enable the designer to predict the results of various aerodynamic configurations in actual flight.

"It is only natural that similar procedures be used for the new generation of V/STOL aircraft and helicopters. However, even though it has been done in this way in the past, there are considerable errors that are introduced in doing so. The reason is that, unlike fixed-wing aircraft, an airstream called downwash, generated by the aircraft model, interacts with the wind-tunnel walls at a short distance from the model (Fig. 1).

"This [factor] can completely change the desired simulation of the real aerodynamic flow field of the aircraft. Therefore, it is very important to know what the restricting factors are on such tests and to what degree corrections must be made in the obtained data to predict accurately the performance of the actual aircraft."

Dr. Kumar states that this consideration raises questions regarding the most desirable wind-tunnel design with respect to the shape and size of the test section, permissible downwash angles and sizes of models, and the maximum and minimum wind speeds at which the tunnel can be run to give meaningful data. Quantitative parametric relationship of these factors is considered absolutely necessary.

In the interest of economy, Prof. Rae decided to simulate different wind-tunnel test-size sections by using inserts within the basic tunnel. Inserts of various cross-sections and axial lengths were used for a large number of tests.

Tests were made in sections of sizes ranging from 8 feet high by 12 feet wide to 3 feet by 4.5 feet, and axial lengths up to 18 feet. Use of inserts of different widths, but of a fixed height-width ratio, made it possible to run the tests using only one rotor and drive system.

The various inserts thus had the effect on the airflow as if only the size of the tunnel had been changed, and the rotor-flow characteristics (Mach and Reynolds numbers for a given wake-skew angle) were maintained unaltered.

Experiments showed, Dr. Kumar states, that the walls have a definite effect on the resultant lift of the rotor, and that definite limit exists on the maximum downwash. At this limit, the airflow in the wind tunnel with the model in place deviates drastically from that which would be expected under actual conditions.

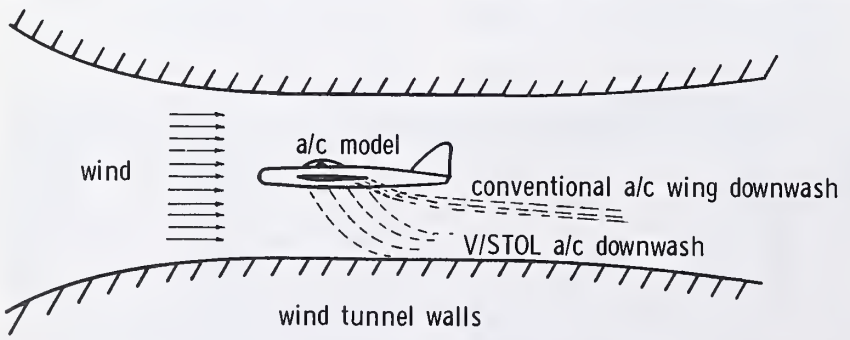


Fig. 1. *In Wind Tunnel Testing*, downwash of fixed-wing aircraft models interacts with walls at considerable distance from model. V/STOL or helicopter model downwash impinges the walls much closer to the model being tested.

WIND-TUNNEL-within-a-wind-tunnel shows how the University of Washington investigator used test-size sections within a basic tunnel. This method of experimentation has proved economical and effective in determining the best shape and size of test sections, downwash angles, model size and wind speeds to give accurate data.

Part of the airstream takes the shape of eddy currents passing through the rotating blades of the model, moving back upstream from the model and then passing through the blades again. This cycle may be repeated several times. As a result, the test may well be negated as a valid index of how the full-size V/STOL aircraft would behave under the supposedly simulated operating conditions (Fig. 2).

A very important conclusion of this study was that for the same cross-sectional area, a tunnel of square cross-section leads to flow breakdown at lower downwash angles than one of rectangular cross-section (w/h ratio of either 1.5 or 0.667). Previously, a square cross-section was thought to be superior for V/STOL tunnels. The present study conclusively proved this to be incorrect.

Prof. Rae's research results have already had considerable impact on other wind-tunnel facilities. A large V/STOL tunnel proposed for the Arnold Engineering Defense Center, Tullahoma, Tenn., has been changed from a 34-foot by 34-foot square tunnel to a 28-foot by 40-foot rectangular one.

His work is also of central concern in discussions now in progress on the design of an optimum test section to be used in a proposed low-speed wind tunnel at Douglas Aircraft that bears

a cost estimate of $8 to $10 million.

Results have stimulated a reevaluation of existing wind-tunnel data by other workers in this field. Much of this information is still considered proprietary by the respective companies.

Many of the wind tunnels currently being used for V/STOL testing in the United States have several drawbacks, it appears clear, and are being used under operating conditions that can vary substantially from those found in free flight.

Reruns of some of the V/STOL wind-tunnel tests prior to the Rae research now show that some of the old data is actually invalid. This is of immense importance, Dr. Kumar points out, since the implications of design of new V/STOL aircraft include such factors as time, money, materials and even human life.

Firms or institutions expressing interest in Prof. Rae's project results to date include: National Aerospace Laboratory, Amsterdam, the Netherlands; Wind Tunnel Centre, National Aeronautical Laboratory, Bangalore, India; Kawaski Aircraft, Japan, and Tokyo University; Northrop-Norair; ARO, Inc.; U.S. Air Force Flight Dynamics Laboratory, Wright Patterson Air Force Base, Ohio; ONERA, Paris, France; Sandia Corp., N. Mex.; and several other U.S. aircraft manufacturers.

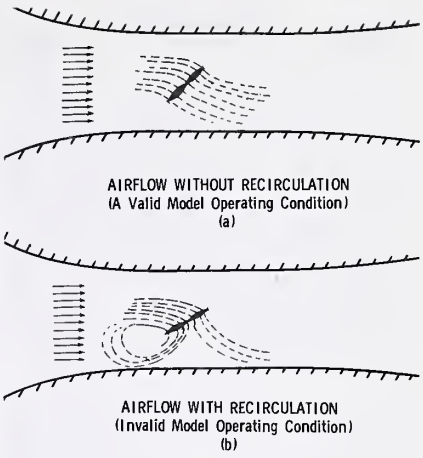


Figure 2.

AR 70-17 Prescribes Roles of Project Managers

(*Continued from page 1*)

system manager would be appointed if:

- Development and deployment of the system would significantly influence elements of the national interest other than the purely military for an extensive period in the future.
- Subelements of the hardware system are expected to require exceptional and prolonged study and experimental effort.
- Development and deployment of such a system also involves significant participation by another service or by an ally of the United States.

The Sentinel System, the antiballistic missile defense program oriented against the Chinese Communist threat, is the first such project to have an Army system manager.

Under provisions of the regulation, whenever need for a major system arises, the Army Chief of Research and Development is required to prepare and coordinate the charter for the system manager. Issued by the Secretary of the Army, the charter will detail the responsibilities and authority of the system manager, his relationship with the project manager and his reporting channels.

Another new concept explained in the revised regulation is that of the initial project management charter, which will be prepared by the head of the developing or procuring agency and forwarded through the Chief of Research and Development. This charter will be issued by the Chief of Staff when it has been determined that the proposal meets the requirements for project management.

The charter will appoint a project manager designate who will chair a working task group. The task group will prepare a preliminary system development plan and a preliminary program change request.

When the project has been approved by the Office of the Secretary of Defense, a final charter, approved and signed only by the Secretary of the Army, will explicitly set forth the name of the project manager and his mission responsibilities and reporting requirements. Usually the project manager designate named in the initial charter will be appointed.

The project manager is given full and continuing responsibility for the development and initial logistic support of the system. He will exercise full line authority over the planning, direction and control of the project, as well as authority over the allocation and utilization of all resources authorized for its execution.

His specific responsibilities are to maintain the system development plan and the project master plan; make technical and administrative management decisions; and approve contractual actions and proposals for in-house activities.

Using management models and techniques, he will amass estimates on project costs, assist design engineers to keep equipment design compatible with future conditions, prescribe an internal reporting system, maintain evaluation and control schedules, and report on progress.

The project manager is charged with insuring that a complete systems approach is adopted for planning and controlling support for systems under development.

After the first system is fielded and support is routine, projects will undergo transition from project management to system support management.

The system support manager will be a commodity command commander who will be responsible for providing primary and continuing support to the project manager during the development phase and who will assume responsibility over the designated system following final acceptance for use.

If the system is of sufficient cost or complexity to justify continuation of some degree of centralized management throughout the life cycle, management of these items or systems will be transferred from the project manager to a product manager.

Product managers may also be assigned by the head of a particular developing agency for projects involving interfaces primarily within that agency. These may need centralized management but do not meet criteria for a project manager appointed by the Secretary of the Army. The product manager's mode of operation is defined as similar to that of a project manager.

The Chief of Research and Development has Army General Staff responsibility for monitoring the overall policies and procedures in the regulation and for coordinating both the initial and final project manager charters within the Army staff. He also acts as Department of the Army point of contact for the product manager appointed to conduct research and development projects.

The regulation also assigns specific responsibilities to the Deputy Chief of Staff for Logistics and to the Assistant Chief of Staff for Force Development.

AVCOM Awards $36.8 Million for Copters

Four letter contracts totaling $36,817,488 recently were awarded to three aircraft manufacturers by the Army Aviation Materiel Command, St. Louis, Mo.

Two contracts went to Bell Helicopter Co. for $19.5 million for UH–1H Iriquois helicopters and $5.5 million for AH–1G Huey Cobra helicopter gunships.

Grumman Aircraft Engineering Corp. received a $2.8 million contract for production of OV–1D Mohawk observation-surveillance airplanes and $9 million went to Boeing Aircraft Co. for CH–47C Chinook helicopters.

Army ENSURE Program Expedites Urgent Needs for Vietnam

When a handful of U.S. Army troops in Vietnam last fall saw Infantry-men unfold huge back packs, spread plastic panels across a canal and seemingly "walk on water," they were viewing ENSURE Item No. 208.

Procedures for *E*xpediting *N*on-*S*tandard, *U*rgent *R*equirements for *E*quipment (*ENSURE*) is one Department of the Army answer to the need for "quick reaction" to meet priority requirements in Southeast Asia.

Last month, less than a year after ENSURE Item No. 208 had the DA stamp of approval, more than 300 "canal bridge" units—each 11 feet long—arrived in South Vietnam for complete evaluation to "prove out" the results of the fall demonstration.

This is but one example of ENSURE, a program which grew from the Quick Reaction Procedures (QRP) developed in mid-1963 by the Assistant Chief of Staff for Force Development (ACSFOR). QRP was a response to an order by then Secretary of the Army Cyrus Vance for materiel procedures to enable commanders to combat counterinsurgency situations more promptly and effectively in remote areas.

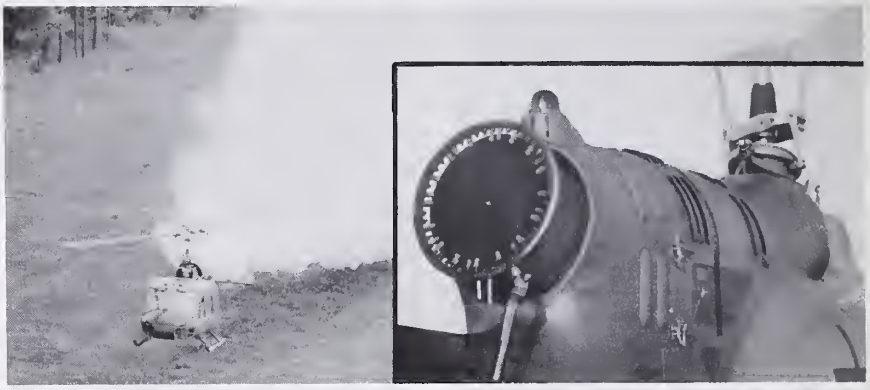
QRP prevailed until June 1965. Then ENSURE became a formal Army procurement procedure for materiel for Vietnam. ENSURE enables Army component commanders and Army sections of Military Assistance Advisory Groups (MAAGs) and missions to submit requirements directly to ACSFOR.

Commanders in Vietnam recommend to the CG, U.S. Army Vietnam (USARV), requirements deemed of sufficient priority to fall within the ENSURE program. After USARV staffing, to determine whether other units have a similar requirement or whether the requirement can best be met by existing equipment, the request normally is cabled to ACSFOR.

The office of the ACSFOR determines the validity of requests, informs the requestors and interested agencies, and orders procurement or development.

When equipment is available as a commercial or off-the-shelf item, the request goes to the Deputy Chief of Staff for Logistics (DCSLOG). If development is required, it goes to the Office of the Chief of Research and Development (OCRD), who directs other R&D agencies to develop the item.

Equipment obtained for evaluation normally goes to Army Concept Team in Vietnam (ACTIV) and further procurement depends on findings of the ACTIV.



Airborne Integral Smoke Generator

The procedures apply specifically to items *not in the Army inventory* and include both commercial items and items that are being developed for military use but have not been standardized and issued.

Under ENSURE, materiel may be used for either evaluation or operations, or both. ACSFOR is the Department of the Army agency which has staff responsibility for the program and validates all ENSURE requirements.

The ACTIV liasion office of ACSFOR monitors the ENSURE program, assigns control numbers to requests, and places them with the appropriate action agency within ACSFOR.

At this writing there are 165 ENSURE items "in the mill." Of these, approximately 85 percent have been acted upon as follows:

- Completed and delivered—50 percent.
- Delivery pending development—20 percent.
- Pending procurement—20 percent.
- Not validated, or canceled, because the materiel or material requested was available or a suitable substitute was found—10 percent.

Development by the U.S. Army Limited War Laboratory (LWL), Aberdeen (Md.) Proving Ground, of the light canal bridge, made of plastics and flexible foam core, is a good example of ENSURE at work. Some others are:

Armor-by-the-yard. LWL received notice of the requirement early in December 1966. By July 1967, a small quantity was fabricated in-house and shipped to South Vietnam for evaluation, resulting in an October 1967 request for 100 sets. The Army Materiel Command designated the Army Tank-Automotive Command, Warren, Mich., to fill the ENSURE requirement.

Armor-by-the-yard is a flexible, relatively lightweight armor paneling for simple, rapid attachment to vehicles and fixed or temporary emplacements. Each panel is approximately two feet wide by three feet high and

"WALKING ON WATER?" Close, but not quite right, as U.S. Army troops test experimental 11-foot-long canal bridge units, ENSURE Item No. 208, in Vietnam.

has six nylon fabric pockets, each containing one 12"x12"x¼" thick XAR–30 high-hardness steel plate.

Airmobile Platform for 105mm Howitzer. USARV stated the requirement Mar. 14, 1967, and it was validated Mar. 18 as ENSURE No. 184. Rock Island (Ill.) Arsenal (RIA) and the LWL initiated engineering design studies on Mar. 21. RIA was directed to proceed with development on May 16 and the first prototype was ready Aug. 17.

The Army Test and Evaluation Command (TECOM) completed testing on Sept. 15 and six prototypes were shipped to Vietnam Sept. 20. A training team from TECOM and the Army Weapons Command (WECOM), Rock Island, completed training in Vietnam Oct. 9.

This ENSURE developmental item was completed in less than seven months. Operational evaluation began in October 1967 and reports indicate that the platforms are working well in Vietnam's Mekong Delta. USARV has requested 30 more units as a result of its evaluation.

The item is an airmobile firing platform deliverable by CH-47 helicopter and is designed to permit firing of the 105mm howitzer from the inundated and marshy areas. It weights 7,300 pounds, measures 22.5 by 22.5 feet and can support the gun, crew and 110 rounds of ammunition.

Squad Radio Receiving Set (AN/PRR-9) and Transmitting Set (AN/PRT-4). The requirement was approved May 10, 1962, and normal development followed. USARV requested 50 units for evaluation Dec. 7, 1965. Approved and validated Dec. 13 as ENSURE item No. 10, it was type-classified Standard A Jan. 20, 1966, and a contract for 50 was signed in March.

Accelerated procurement was requested by the USARV commanding general and the first 50 sets arrived in Vietnam Aug. 24, 1966. Evaluation by ACTIV was completed Nov. 15, 1966, and 1,000 units were shipped Mar. 7. By July 12, 1967, reports showed 2,580 PRT-4 and 3,580 PRR-9 units were delivered.

These units provide a lightweight transistorized FM transmitter and receiver set for tactical use by platoon, squad and fire-team leaders. The transmitter is hand-held, battery-operated and has a dual-channel capability. The receiver, similarly powered, is designed for quick attachment to the standard combat helmet.

Airborne Integral Smoke Generator. Nine months from the validation of a contract, 20 of these systems for UH–1 helicopters were made available. Developed by LWL, two prototype systems were delivered in Southeast Asia Aug. 26, 1966. Twenty additional heater compartment smoke generator systems were shipped from the contracting plant Feb. 15, 1967. Drawings and specifications were turned over to Edgewood Arsenal (the parent agency) to meet an ENSURE request for production for full operational use.

The airborne generator produces a 7,000-meter smoke screen lasting two minutes in moderate (two to five knots) winds. It can be dispensed by a UH–1 helicopter flying 60–80 knots at an altitude of 50 feet.

Procedures spelled out in the most recent letter from the Adjutant General of the Army concerning ENSURE, dated Nov. 3, 1967, are refinements of the QRP of nearly five years ago. ENSURE procedures, the Department of the Army states, are now in their best format to serve the needs of commanders in Vietnam.

Engineers Evaluate MUMS As Mobile Power Source

Electric power for field Army requirements, such as the Medical Unit Self Transportable (MUST), may be revolutionized by a Mobile Utility Module System (MUMS) now stated as a Qualitative Materiel Requirement (QMR) being evaluated by Army engineers.

Prepared by the Mobility Equipment Research and Development Center (MERDC), Fort Belvoir, Va., the QMR for MUMS is being evaluated by the U.S. Army Combat Developments Command, headquartered at Fort Belvoir.

A QMR states the justified need for an item or system from the standpoint of operational concepts, characteristics and performance. As applied to MUST, the MUMS would provide a reliable power system for the highly mobile surgical, ward and utility elements—used singly or in multiples to form a field hospital complex.

As proposed in the QMR, a mobile utility module pack can be produced with the capability of supplying the power needed to run three air conditioners, three collective protector chemical-biological-radiological units, hot and cold water, and compressed air, all in one pack.

Recommended features for the MUMS family include six sizes. The largest member of the proposed family will be the MUMS 240–50, capable of producing a cooling capacity of 240,000 Btu, a heating capacity of 820,000 Btu and 50 kilowatts of power.

ARMY, AIR FORCE top "thinkers" and developers met during recent briefings at HQ U.S. Army Combat Developments Command (USACDC), Fort Belvoir, Va. Heading the military officials were (from left) Lt Gen Charles T. Terhune, vice commander, U.S. Air Force Systems Command, Andrews Air Force Base, Md.; Lt Gen Harry W. O. Kinnard, CG, USACDC; Maj Gen Glen A. Kent, deputy chief of staff, Development Plans, U.S. Air Force Systems Command.

USACDC Director of Doctrine Brig Gen Wallace L. Clement, presents Army Commendation Medal with Oak Leaf Cluster to Lt Col Wayne E. Spilker (left), staff officer with the Doctrine Directorate. The award recognized his role with the Air Force in C–5A aircraft development. General Clement represented the USACDC at the recent roll-out of the Lockheed C–5A in Marietta, Ga. The C–5A is expected to add a significant deployment capability after testing of the craft has been completed and squadrons become operational, scheduled in late 1969.

U.S. Army Medevac Teams' Precise Techniques Set 'Save Rate' Mark

Split-second precision of U.S. Army medical aidmen, courageous skill of pilots and increased use of "medevac" helicopters in Vietnam account for the highest wartime casualty "save rate" ever recorded.

A 3-year Office of the Surgeon General (OTSG) casualty summary (January 1965 through January 1968) states that 61,900 Army troops have been reported as wounded.

The death rate of those admitted to medical facilities is 2.3 percent, as compared to 2.5 percent for the Korean conflict and 4.5 percent for World War II, and 8 percent for World War I.

Rapid evacuation of wounded by helicopter in Vietnam brings many patients to surgery and definitive care much earlier than was previously possible. Some mortally wounded patients reach hospitals alive who in earlier wars would have died on the battlefield and therefore counted among the "killed in action."

Fragmentary data received by OTSG statisticians from January 1968 to mid-March indicate heavier casualties. "Gross estimates" for the period place the save-rate at about the level as in the Korean conflict. Statistical experts say, however, that the effect of this period of heavy casualties probably will level off and the cumulative rate will continue considerably below the Korean figures.

Medical research and development have provided for all fighting men in South Vietnam modern field equipment for almost "instant care." With 16 Army surgical field and evacuation hospitals strategically located in the area, no wounded man is more than 30 minutes from expert care in most cases when a medevac helicopter picks him up.

Six Army-developed MUST (medical unit, self-contained, transportable) hospitals, including two Navy units supporting the U.S. Marine Corps, are active in Vietnam. The original Army MUST at Tay Ninh, activated about 18 months ago, is used by the 45th Surgical Hospital Unit.

In an article published recently in *U.S. Medicine*, The Army Surgeon General (Lt Gen) Leonard D. Heaton, MC, told of his observations in Vietnam and praised support given by the Army Medical Service (AMEDS) in the Far East and other areas of the world.

The Department of Defense Armed Services Medical Regulating Office (ASMRO), he said, is vital to the "superior" medical care being demonstrated. ASMRO in Washington, D.C., coordinates the evacuation network from overseas areas.

LITTER BEARERS unload U.S. Army Ranger from UH-1D helicopter at 15th Medical Battalion hospital at Hammond Field in South Vietnam.

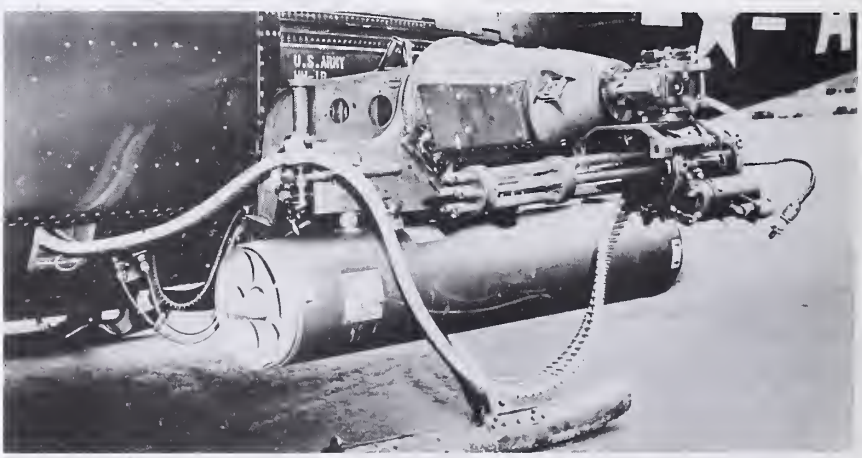
Manned by tri-Service representatives, ASMRO assigns each casualty returning to the United States to the appropriate hospital—"the one nearest his home, which is equipped and staffed to provide whatever special care may be required."

The Army is executive agent for ASMRO. The Far East regulating office at Camp Zama, Japan, consolidates lists of patients reporting to ASMRO from the six hospitals in Japan and from Korea, Okinawa and Guam. It also coordinates with the joint medical regulating office in Vietnam at the Military Assistance Command HQ in Saigon (MACV).

Patients from hospitals in Vietnam going to facilities at the offshore bases in Japan, Okinawa, Guam and Hawaii are regulated by the MACV office. The U.S. Air Force hospital at Clark Air Base, Philippines, reports daily to ASMRO.

General Heaton reported that 16 aeromedical flights arrive at Travis (Calif.) and Andrews (Md.) Air Force Bases each week. A special flight leaves Japan each Monday, bringing badly burned victims to the surgical research unit at Brooke Army Medical Center, Tex., or the U.S. Naval Hospital, Oakland, Calif., for the highly specialized care they require.

General Heaton said the flow of patients from the Far East during 1967 exceeded any year of the Korean



M21 WEAPON SYSTEM, now being used in Vietnam, consists of a machinegun and a rocket pod mounted on each side of a helicopter. The 7.62mm gun is capable of firing at rates of 2,400 or 4,000 rounds per minute. The 14 rockets (seven in each pod) are fired at rates up to six pairs per second. Reports from Vietnam to HQ U.S. Army Weapons Command, Rock Island (Ill.) Arsenal, indicate the system is serving well in protecting combat troops while unloading.

War. Approximately 41 percent were Army servicemen. During the year, some 60 Medical Service air ambulances in Vietnam averaged about 7,000 evacuations a month.

Medevac helicopters, he noted, transport patients from the battlefield faster than the average motor ambulance can pick up a traffic victim in American cities. Newly developed devices such as the personnel rescue hoist, the forest penetrator and a small lifting mechanism make it possible to remove wounded from areas otherwise inaccessible by air.

The Surgeon General praised highly the teamwork responsible for the success of air evacuation procedures. The Army psychiatric service, which stresses preventive measures, was acclaimed for having "probably done as much as anything else" to bring about the "lowest morbidity and evacuation rate ever experienced in a large-scale combat situation."

Army nurses, dieticians and physical therapists drew his plaudits as integral parts of the Vietnam medical teams. He particularly cited the nurses for their off-duty good-will work among the Vietnamese people.

Current Army policy for evacuating wounded from Vietnam applies generally to those whose expected term of hospitalization is more than 60 days. The Army also maintains a large Vietnam convalescent hospital.

The OTSG statistical report shows that of the total reported as wounded over the 3-year period, about 18,300 (30 percent) had wounds so minor that the soldier could be treated and returned to duty without admission to a medical facility.

Of the 43,600 admitted to some type of medical treatment facility, 33,930 required hospitalization. About 50 percent of the soldiers hospitalized in Vietnam have returned to duty.

Lumping all hospital cases, including those elsewhere in the Pacific area and in the continental United States, about 89 percent of those hospitalized have been returned to duty, the report states.

When all deaths due to combat are considered (those killed in action, dead of wounds, died while captured and declared dead from a missing status), losses in Vietnam are at a lesser rate than in Korea or in Europe in World War II.

From July 1965 through January 1968 in Vietnam, deaths due to all combat causes occurred at a rate of 19.2 per 1,000 average troop strength per year. This compares with a rate of 43.2 for Korea and 51.9 for the European Theater of Operations from June 1944 (D-Day) through May 1945 (V-E Day).

Available data on the causes of wounds and deaths in Vietnam show that much higher proportions are due to small arms fire, booby traps and mines, than in Korea or World War II and much lower proportions are due to artillery and other explosive projectile fragments.

The Office of The Surgeon General places great credence in the "intern residency effort" begun some 25 years ago, right after World War II. Medical training of Army doctors and enlisted aidmen was stepped up to keep pace with civilian medical R&D.

In Vietnam today, the split-second timing often required for litter bearers and aidmen to transfer casualties to a helicopter under fire is the result of rigorous training.

Aidmen must use their medical knowledge in the air as well. Descriptions of the wounds by voice radio to the evacuation controller on the ground enable the aircraft to be directed to the nearest medical facility specially capable of treating that particular case.

All these things combined, the results of training to use in the best possible manner the materiel and manpower resources of the U.S. Army Medical Service, produce the truly rewarding vital statistics—fewer deaths from battlefield wounds and a steadily improving save-rate.

THE U.S. ARMY RESERVE celebrated its 60th anniversary on Apr. 23. Although the tradition of the citizen-soldier in our nation's defense goes back to the earliest days of our country's history, Apr. 23, 1908, is considered the official birth date of the Reserve. On that day, the 60th Congress established the Medical Reserve Corps as the first Army Reserve unit. It has grown from its original 364 officers to more than one million officers and enlisted men and women.

$45 M67 Training Round Cost Cut to 10 Cents

Reduction from $45 to 10 cents in the cost of firing a training round from the M67 recoilless rifle—a saving of about $4,490 on 100 rounds—was reported recently by Watervliet (N.Y.) Arsenal scientists.

Capable of destroying any known tank, the M67 uses a high explosive 90mm antitank (HEAT) round that costs about $45 and has about twice the range of the 3.5-inch bazooka antitank shell it has replaced.

In firing practice, however, the HEAT round has been costly in two ways. In addition to its high price tag, it had the disadvantage of tearing up the targets. Expense of replacing targets was considerable and time required slowed down training.

The new training device for the M67 consists of a cylinder the same size and shape as the regular 90mm round. A standard 7.62mm rifle round (the same round used in the Army's M14 rifle) is loaded into the breech of the training device and fired.

Precisely designed vents in the breech end of the training device cause the 7.62 round to approximate speed and trajectory of the regular HEAT round. When the gunner fires at a target, he gets the same functional training as with the regular HEAT round.

Targets that were virtually demolished by a HEAT round are relatively undamaged by the 7.62mm rifle round. Thus the reduction of replacement expense and the cost of manpower can be added to the $44.90 saving for each round fired.

STANDARD 7.62 rifle round (far right) is loaded into breech end of training device which has same size and shape as a regular 90mm round fired from the M67 recoilless rifle. Precise design of vents in the breech end of the training device causes the 7.62mm round to approximate speed and trajectory of regular High Explosive Antitank (HEAT) round used in combat, at substantial economy.

U.S., Asian Biologists Study Bird Migration Relationship to Diseases

U.S. Army and Asian biologists are engaged in an international Migratory Animal Pathological Survey (MAPS) to determine the extent to which Asian birds migrate, and to relate movements to dispersion of diseases common to man and birds.

The MAPS is administered by the U.S. Army Research and Development Group (Far East), under the command of Col Charles W. Cook. Dr. H. Elliott McClure, a U.S. civilian assigned to Walter Reed Army Institute of Research in Washington, D.C., with station in Bangkok, Thailand, coordinates the program.

Scientific teams are gathering data for the MAPS through grants and contracts with universities and ornithological institutions in Korea, Japan, Okinawa, Taiwan, the Philippines, Sabah, Sarawak, Malaysia, Indonesia, Thailand and India. The program is funded by the U.S. Army Medical Service.

At the inception of the survey in 1963, almost nothing was known of the migration of Asiatic land birds and their relationship to the dispersion of diseases—especially Japanese encephalitis and scrub typhus—common to wild animals, domestic animals and man.

Encephalitis is a virus transmitted by two or three species of mosquitoes from man to man, man to animal or birds, animal or birds to man, and animal or bird to animal or birds. The disease affects the brain tissues and produces paralysis.

Scrub typhus is a rickettsia transmitted from animal to animal and animal to man by at least two species of chiggers (the 6-legged young of mites) carried by rats.

Both diseases have complex life histories (epidemiologies) and U.S. Army Medical Service researchers were involved in studies of their origins, routes of transfer and related factors when they became involved in the MAPS project.

In his latest MAPS program report, "An International Study of Birds in Asia," Dr. McClure summarizes the causes and effects of the diseases and some of the results of the program, stating in part:

"So far, doctors know only that birds contract encephalitis from mosquitoes, and that they can carry infected chiggers long distances, but what this means in the epidemiology of both diseases are unanswered questions.

"What species of bird migrate? Where do they go? How far is one bird capable of flying in a few days, or in a year? What species of birds carry the chiggers with them when they migrate? How does all of this tie in with facts known about the diseases?"

To answer these questions, the MAPS has set up teams of researchers at numerous sites throughout the Far East to catch and band migratory birds and to take blood samples and ectoparasites from representative numbers of each species.

Entomologists and medical institutions throughout the world cooperate with the program in the identification of the parasites at no cost to the U.S. Government. They benefit from it by the exchange of information and materials. Even the Russians cooperate by returning information on band recoveries in Siberia.

"In eastern Asia," the report states, "from the equator to the Arctic, there are over 1,800 species of birds. By now more than 700 species have been caught and 400,000 individuals are bearing rings or bands. These rings have inscribed on them: 'Write P.O. Box 3443, Hong Kong,' and there is a serial number such as 011–56720 or 090–95432. The first number tells the size of the ring."

Some teams are using Japanese rings inscribed with a number and Kanji characters referring to the Norincho (the Game Department). Other teams are using British rings inscribed with: Notify BTO (British Trust for Ornithology) London.

Numerous bird-banding activities besides MAPS are in progress and birds in the Asian area may be found with a ring inscribed in English, Russian, Korean, Japanese or Chinese. Information from these activities are coordinated with MAPS.

Dr. McClure's report states that in Malaya, the banding team and volunteers have ringed more than 50,000 birds, most of them in Selangor and Pahang. Ringed birds are seldom found when they die and the number of recoveries is always low—usually less than two-tenths of one percent of the birds marked.

"Birds are long-lived," Dr. McClure points out, "so the records return slowly. After three years it has been shown that the night herons from nesting colonies in northern Perak disperse over most of northern Malaya. They have been reported more often from the west, but that is where the human population is greatest." The report continues:

"A black bittern from Selangor went as far north as Manipur State in Northeastern India. Swallows from Pahang have been recaptured in Bangkok, Korea, Eastern Siberia and as far north and west as Lake Baikal. Purple herons banded as nestings at Lake Khanka in eastern Siberia have been taken in eastern Malaya.

KOREAN student with banded heron.

"Other studies at other centers are having equally interesting results. There appears to be a main flyway of egrets and herons from Japan and Taiwan into the Philippines and Sabah.

"Shrikes from China and north go to the Philippines for the winter. Ducks that overwinter in Japan come from Siberia and Kamchatka. A yellow wagtail from Taiwan was found nesting in northern Alaska. A hawfinch that wintered in Korea went to western Siberia, almost to the Ural Mountains, to nest.

"Gradually information will accumulate until ornithologists can plot on maps where each migrant species goes. They will also learn from these recoveries how long birds live and from that how many times a migrant bird makes it journey north and south."

Once each year the senior scientists participating in the MAPS program meet to discuss their methods, problems and results. In 1964 they met at Taichung, Taiwan, in 1965 at Kuala Lumpur, Malaysia, in 1966 in Tokyo, Japan, and in 1967 at Dalton Pass in Luzon, the Philippines.

In addition to assisting science and medicine in determining the extent and spread of the bird-borne diseases, the MAPS project information contributes to long-term programs for control and conservation of wild life.

Kinnard Urges U.S. 'Copter Needs Board

Parallels between military uses of helicopters in Southeast Asia and future applications to civilian requirements warrant the creation of a board to analyze the nation's needs.

Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command, expressed that viewpoint recently in speaking at the Fifth Annual Edwin A. Link Lecture in the Smithsonian Institution, Washington, D.C.

"I believe the helicopter has technologically come of age largely as a result of the improvements developed to meet military operational requirements," the former commander of the 11th Air Assault Division said. "We should be planning and preparing now for this great expansion."

The use of helicopters by busy executives, he said, rather closely relates to the heliborne movement of commanders and key staff officers to save valuable time and to move to points not otherwise accessible.

Military use of the flying crane helicopter to transport and accurately position heavy cargo, it was pointed out, has a civilian parallel in certain construction requirements, such as moving heavy equipment to the top of tall buildings, or positioning a church steeple.

The U.S. Army Combat Developments Command headed by General Kinnard is often referred to as a "think factory" because of its assigned mission of developing advanced military concepts. In discharging this responsibility, the Command has figured strongly in the formulation of concepts for military use of helicopters.

The function of a board to analyze future civilian requirements for helicopters, General Kinnard said, would somewhat parallel that of the Howze Board. Headed by General Hamilton H. Howze, this board considered the military aircraft requirements, with emphasis on development of helicopters designed for combat support.

The analysis stage, General Kinnard said, should be followed by "a period of testing the many promising uses of helicopters." He explained that the testing period could be compared to what the Army did with the 11th Air Assault Division, which tested the theories of the Howze Board.

The testing phase would include detailed studies and tests of what the general termed "micro-weather, micro-navigation, micro-traffic control, micro-communications, that is, these functions as they apply to helicopters moving within or between cities."

Looking into the future, he suggested "the actual landing pads in the heliport should be in the form of a turntable so that the helicopter does not have to move about at a low hover to position itself for refueling, passenger loading and unloading."

SATCOM Fields IDCSS Units in Guam, Australia

Small AN/TSC–54 satellite communications terminals were airlifted to Guam and Australia late in February as the newest ground links in the worldwide Initial Defense Communications Satellite System (IDCSS).

Designed as the quick-reaction terminal for the IDCSS, the AN/TSC–54 and its 6-man crew can be loaded into a C–130 transport plane, flown anywhere on earth and, within two hours, can be assembled and ready for teletype and voice operation via satellite.

The 23,000-pound terminal is broken down into packages weighing not more than 6,000 pounds each for helicopter lift. It also can be carried by truck, including the power generator and operations shelter.

A novel feature developed recently is the AN/TSC–54's antenna, a cassegrain type with four parabolas in a cloverleaf configuration. When the unit is in transit, the feeds are detached, the parabolas folded in clamshell fashion, and the hinged antenna mast placed horizontally.

The second major terminal component is the operations van, a shelter approximately 15 feet long, 7 feet 4 inches wide and 7 feet 5 inches high. It houses two operating consoles, one for tracking and one for communications, together with supporting electronics and terminal apparatus. Diesel generators for power in remote areas complete the assembly.

The AN/TSC–54 terminals were developed for the U.S. Army Satellite Communications Agency, Fort Monmouth, N.J., by Radiation Inc., headquartered in Melbourne, Fla.

AN/TSC–54 satellite communications terminal, with antenna folded clamshell fashion, is loaded into C–130 for airlift to an Australian installation.

Quantum Electronics Meet Scheduled May 14 in Miami

U.S. Army, Navy and Air Force offices of research and the Joint Council on Quantum Electronics will cosponsor the fifth International Quantum Electronics Conference at Miami, Fla., May 14–17.

Prof. Charles H. Townes, 1964 Nobel Prize winner for fundamental research in quantum electronics at Massachusetts Institute of Technology which led to development of the maser-laser principle, arranged the first conference in this series in 1959.

The Army Research Office, Office of the Chief of Research and Development, the Office of Naval Research, and the Air Force Office of Scientific Research will send representatives to the conference.

Other participants will be representative of the Joint Council on Quantum Electronics, including the American Physical Society and the Optical Society of America of the American Institute of Physics; also, the Groups on Electron Devices and Microwave Theory and Techniques of the Institute of Electrical and Electronics Engineers (IEEE).

Topics of presentations will include basic theory and physics of masers and lasers; optical parametric interactions and devices; advances in quantum electronic devices and technology; and general applications of quantum electronics. The state-of-the-art and applications of quantum electronics also will be discussed.

Other areas of interest will include light modulation and detection; laser rangefinding and radar; coherent signal processing and holography; frequency standards; medical application of lasers; and reports of more fundamental studies on the behavior of coherent light in materials.

Selected papers will be published in one or more issues of the *IEEE Journal of Quantum Electronics* shortly after the conference.

U.S. Army Medical Research Team Commanders, Vietnam

Col Paul E. Teschan
(*1963–64*)

Col Stefano Vivona
(*1964–65*)

Lt Col Robert J. T. Joy
(*1965–66*)

Lt Col H. G. Dangerfield
(*1966–67*)

Unit Commendation Recognizes USAMRT Activities in Vietnam

Four years of notable success by the U.S. Army Medical Research Team in Vietnam in developing methods of protecting the health of United States Forces have been recognized by numerous awards, climaxed recently by a Meritorious Unit Commendation.

The USAMRT is a special activity of Walter Reed Army Institute of Research, U.S. Army Medical Research and Development Command. Since November 1963, the team has accounted for a substantial increase of knowledge concerning causes and control of diseases important to Vietnam operations.

Brig Gen Albin F. Irzyk, CG of the U.S. Army Headquarters Area Command in Saigon, presented the Meritorious Unit Commendation to Lt Col LeeRoy G. Jones, MC, chief of the USAMRT, and noted the numerous major contributions to improved health attributable to the team's efforts.

MERITORIOUS UNIT COMMENDATION is presented to Lt Col LeeRoy G. Jones, commander of the U.S. Army Medical Research Team in Vietnam, by Brig Gen Albin F. Irzyk, CG, U.S. Army Headquarters Area Command, Saigon.

During the first year, the team developed programs and protocols for the study of malaria, hepatitis, dengue, cholera, plague and diarrheal diseases. Another accomplishment was the recognition of chloroquine-resistant falciparum malaria to estimate its potential effect upon military operations in Vietnam, including the defining of occurrence areas.

Establishment of a Joint Commission of Pathologic Research in Vietnam, growing out of USAMRT efforts, brought together the health authorities of the Republic of Vietnam, the United States Agency for International Development Mission, and the U.S. Armed Forces.

Subsequently, several USAMRT members taught at the University of Saigon Medical School. Results increased the professional capabilities of Vietnam physicians and contributed importantly to Vietnamese-American communication and cooperation on health problems.

Collaborative effort was developed by the team during its second year of existence with the Pasteur Institute of Vietnam, leading to the construction and operation of the only plague research laboratory in Southeast Asia. From the investigations of this laboratory, the extent and severity of plague in Vietnam was documented.

In 1961, only eight cases of plague were reported from a single area; by 1966, human plague had been found in every province of South Vietnam Army I, II and III Corps areas and in one province in the IV Corps area. In 1965 alone, 4,500 cases of plague were reported to the team.

During a pilot program for rodent and vector control in the Miny Mang district of Cholon, rat fleas were demonstrated to be resistant to the DDT concentrations used.

Data acquired in this study and laboratory investigations of the insecticides Dieldrin and Diazinon provided the Ministry of Health of the Republic of Vietnam with information essential for reduction of the vectors of plague and its subsequent control.

Fevers of unknown origin in American troops investigated by the team resulted in diagnosis of the first cases of malaria in personnel from the 173rd Airborne Brigade near Bien Hoa. This alerted command and medical authorities to the major health threat and the need for special preventive and control measures.

USAMRT's third year coincided with the rapid build-up of United States Forces in Vietnam. Warnings that had been issued about the chloroquine-resistant falciparum malaria proved to be accurate. Significant medical problems developed and the team devoted much of its efforts to studies of possible control procedures.

Numerous contributions of new knowledge by the USAMRT included discovery of asymptomatic malaria in American soldiers, with its potential for importation to the continental United States. Documentation of failures of malaria discipline and personal protective measures provided the information necessary for control.

Field testing of diaminodiphenylsulfone established its efficacy for routine use as a new malarial chemoprophylactic. Other efforts resulted in introduction of Fanasil and pyrimethamine as new therapeutic drugs. The team also developed regimens for treatment of malaria and gave staff and consultative assistance to the various command surgeons.

Neuroendocrine stress due to combat among helicopter crewmen and Special Forces "A" Detachment members led to USAMRT studies that contributed significantly to understanding of the pathophysiology of stress in the soldier.

Similarly, studies of heat stress incurred by crews of Mohawk (OV–1) aircraft led to changes in the man-clothing cockpit systems that improved crew comfort and efficiency.

In cooperation with the staff of the 93rd Evacuation Hospital and the Southeast Asia Treaty Organization Medical Research Laboratory in Bangkok, Thailand, USAMRT researchers succeeded in determining the specific etiology of fevers in 60 percent of patients studied. Fifty percent of the cases diagnosed were due to dengue. Chikungunya, scrub typhus and malaria accounted for most of the others.

With these laboratory results, physicians have been able to suspect these diseases in the absence of classical findings early in the course of hospitalization.

Collaborative studies with the Department of Neuropsychiatry at the Army of the Republic of Vietnam Cong Hoa Hospital led to a better understanding of the stresses of combat applicable to both U.S. and Vietnamese soldiers. In addition, USAMRT members provided support and guidance to various research teams on temporary duty from the United States.

Programs conducted with Vietnamese health authorities were expanded by USAMRT in 1966. A new bacteriological laboratory for the study of enteric diseases was established at the Pasteur Institute. The facility processed more than 5,000 speciments during the first nine months of its existence. It was the sole source for bacteriological diagnosis of cholera during the 3,000-case epidemic in Saigon in 1966.

Construction was started on two more floors of the joint laboratory of the United States Army Medical Research Team (WRAIR) and the Pasteur Institute of Vietnam, to permit further expansion of plague research.

The common house shrew, *Suncus murinus*, was shown for the first time to be a reservoir of plague. An asymptomatic carrier state of virulent plague bacilli in the throats of healthy people was demonstrated for the first time in Vietnam. Rat and flea survey programs and insecticide evaluation programs also were expanded.

Data produced by USAMRT are of immediate importance to all health authorities concerned with controlling the further spread of plague. A program was initiated for production and evaluation of a lyophilized, attenuated living plague vaccine, which will materially improve the vaccination program in Vietnam.

A new problem in the care of wounded soldiers in Vietnam was presented in 1966. Rapid helicopter evacuation brought numerous very severely wounded to hospitals. To define and to develop methods of correcting the severe metabolic derangements in such men, a special group of investigators was established and has continued to function.

Certain of the approaches developed by this group now are in general use and others will be adopted as appropriate laboratory equipment becomes generally available. One result is that the value in man of a cyanoacrylate spray for the control of hemorrhage from extensive injuries of the liver and spleen not amenable to control by other techniques has been demonstrated in extreme emergency cases.

Certain studies of medical problems must be accomplished under combat conditions. To facilitate such studies, the WRAIR Team was expanded in 1966 to include a component of Special Forces medical and paramedical personnel.

Working primarily with Special Forces combat teams deployed in various areas of Vietnam, this USAMRT section has conducted numerous field investigations. Epidemiologic data has been collected prior to the entry of large groups of American personnel.

Examples of their findings include identification of the mosquito vectors responsible for transmission of malaria in the forest, studies of malaria in the indigenous populations, detailed examination and control of plague, a search for schistosomal infection, and ecologic studies of scrub typhus.

In 1966, a Motion Picture Section was deployed to Vietnam and became part of the WRAIR team to record the many aspects of military medicine in a combat zone. To date, more than 250,000 feet of movie film and about 26,000 color slides have been taken. Blended into meaningful professional medical films, they are providing current visual training aids for all Armed Forces medical personnel.

Some indication of recognized value of the activities the WRAIR's medical Research Team is provided by the decorations and awards made to assigned personnel and others still pending. Awards to date include 2 Silver Stars, 6 Legions of Merit, 11 Bronze Star Medals, one Bronze Star Medal with "V" Device, 5 Air Medals, 38 Army Commendations Medals, 11 Army Commendation Medal with "V" Device, 2 Purple Hearts, 6 Meritorious Civilian Achievement Certificates, 5 USARV Certificates of Achievement and 4 Combat Medical Badges.

U.S. ARMY COMBAT DEVELOPMENTS COMMAND (USACDC) Deputy CG and Chief of Staff Maj Gen William A. Becker gets second star pinned on by Lt Gen Harry W. O. Kinnard, USACDC commander, assisted by Mrs. Becker.

New WRGH Lab Studying Radiation Effects

Providing answers to some of the human factors problems that might arise in the event of nuclear warfare is among functions assigned to a newly established Behavioral Science Laboratory at Walter Reed General Hospital, Washington, D.C.

Headed by Dr. Aaron Wolfgang as principal investigator, the new unit is funded by a $30,000 grant for this year from the Defense Atomic Support Agency. Walter Reed Army Institute of Research is assisting in developing the project through its Division of Neuropsychiatry.

Dr. Wolfgang is a specialist in radiation therapy and has developed unique psychological testing methods at the University of Oklahoma Medical School. Researchers under his supervision will work with three groups of people in seeking answers to such questions as, for example:

In case of nuclear warfare, how will a soldier react to a large exposure of radiation?

The first group of research subjects consists of people without diseases who have not been subjected to radiation. The purpose is to establish norms for test purposes.

The second group includes patients in the hospital with no disorder to the central nervous system who will receive cobalt or 2-million volt X-ray treatment for cancers or tumors.

In the third group are patients receiving treatment for damage to the central nervous system.

The research involves testing each patient two hours at a time before radiation, once at the beginning, twice during, and once after therapy.

Up to this time, minor studies have probed only singular aspects of the effects of radiation, such as changes in blood or psycho-motor control.

Behavioral Science Laboratory investigators will study the total aspect of the patient's behavior including reflexes, blood pressure, decision-making, memory, intelligence, neuromuscular control and personality factors.

If an accident occurs in which someone is exposed to radiation, the laboratory's equipment can be moved immediately to the scene for on-the-spot testing.

Major research emphasis in the past has been placed on the reaction of animals to radiation. Dr. Wolfgang points out, however, that it is difficult to generalize the results of animal studies and relate these to human beings. The nervous system is similar, but there is no way to compare the limits of dosage of radiation.

Dr. Wolfgang's task admittedly is difficult since his tests must distinguish what reactions are the result of the patient's cancer, surgery or radiation. If results can be obtained, they will have vast significance in answering the questions posed by the researchers.

CARDE Planning Meeting Of TTCP Infrared Group

Infrared specialists of the quadripartite Technical Cooperation Program (TTCP), representative of America, Britain, Canada and Australia, will be guests of Canada in Toronto and Quebec, May 21–24.

One of the scheduled highlights of the Subgroup J meeting is a discussion of laser state-of-art by specialists of the ABCA nations. Participants will include Dr. E. J. Schiel and Dr. Hans Hieslmair, Electronics Components Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J.

The U.S. delegation will include Dr. Werner K. Weihe, national leader and executive member of Subgroup J, of the Night Vision Laboratory, Fort Belvoir, Va.; Dr. Robert B. Watson, Army member, Army Research Office, Office of the Chief of Research and Development; and Benjamin Goldberg, director of the Night Vision Laboratory and also U.S. national leader of Working Panel J–5 on night vision.

NBS Precisely Controls Water Bath Temperatures

Precise control of water-bath terperatures to within 25 millionths of a degree centigrade for 24 hours has been achieved by two scientists at the National Bureau of Standards (NBS), Gaithersburg, Md.

Reportedly, the control exceeds the stability of any other known constant temperature system. It allows more accurate measurement of minute heat changes in microcalorimeters used at the NBS Radio Standards Laboratory as the national standards of microwave power.

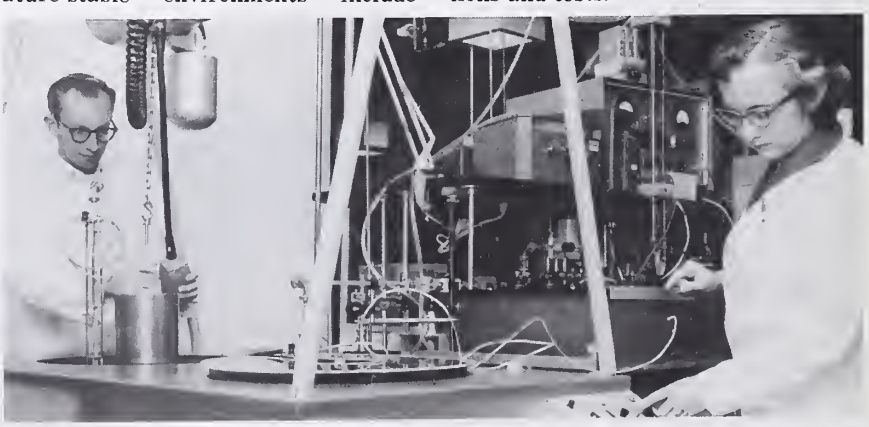
To keep pace with new power standards, Neil T. Larsen and Morris E. Harvey aimed to design a bath with temperature stability of ±.0001°C.—50 times better than previously existing stability—to control temperatures for microwave calibrations. Results far exceeded their "ambitious" goal.

Physical and chemical measurements that must be made in temperature-stable environments include molecular weight determinations, voltage comparisons with standard cells, and energy measurements by several types of calorimeters.

The system design finally selected isolates the temperature-controlled volume from major paths of energy exchange. It employs a temperature controller containing an alternating current (a.c.) bridge with inductively coupled ratio arms.

All bridge components that would be affected by temperature are located within the controlled-temperature environment.

Many of the NBS microwave power transfer standards have been calibrated in the new table bath medium and used to make approximately 1,400 calibrations of primary laboratory standards sent to NBS by U.S. military and industrial standards laboratories. These lab standards are used in many thousands of routine calibrations and tests.



NATIONAL BUREAU OF STANDARDS scientist Fred Clague lowers an 18–26.5 GHz power standard into a new temperature-stable bath at the Radio Standards Laboratory. Ann Rumfelt is admitting water to a second test bath.

Touring Van Shows Army 1990s Concepts

Public understanding of the U.S. Army Combat Developments Command's mission of providing advanced planning answers to "How should the Army fight, be equipped, and be organized?" will be improved by an exhibit van now on a cross-country tour.

Titled "Today's Vision—Tomorrow's Victory," the exhibit is housed in a 12-ton, 37-foot-long expansible van that features many colorful displays of Army equipment and combat concepts, including gadgets the viewers can manipulate to simulate tactical combat situations.

From March until mid-December, the van will be on a continuous tour of colleges, fairs, festivals, rodeos, air shows, carnivals, expositions and military installations. The schedule will be rigorous, often requiring 400 or more miles of travel a day between showings.

War gaming, a method of simulating combat situations to evaluate new concepts, is presented in the form of a simplified game to show how the U.S. Army Combat Developments Command (CDC) uses this technique to develop advanced planning concepts.

The objective in the exhibit is to capture the enemy's jungle strongpoint by using one of four platoon-sized units. By pressing a button to employ the force of his choice, the viewer will see the result of his tactics.

In one section of the exhibit, viewers will take a simulated trip into the 1990s and see how today's actions at CDC are envisioned to meet the challenges of tomorrow.

Other highlights include a motion picture which points up the role the CDC plays for operations of today's Army; a color slide show on Army airmobility; and a colorful flow chart outlining the stages in the development of hardware for combat use.

The exhibit was produced by the Army Exhibit Unit at Cameron Station, Va., with technical assistance from CDC headquarters at Fort Belvoir, Va. In charge of the CDC exhibit for the second year in a row is M/Sgt Joseph N. Thomas of the Exhibit Unit staff. He is being assisted by three enlisted personnel.

Army Builds Desert Targets For Navy Walleye System Test

Three types of Army ground targets constructed at the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz., are being used by U.S. Navy fliers to test the Navy's Walleye air-to-ground weapons system.

One target is 80 feet long by 20 feet high. Located in the desert north of Dateland, Ariz., at a precise 10-degree angle, it is painted in stripes to allow measurement of resolution of the diving aircraft target sensors. Nearby are three large elliptical pieces of olive-drab canvas, contrasting with the earth to provide a secondary target for high-flying planes.

A third target, 12 miles from the others, is a 100- by 300-foot panel, illuminated by a 10-kw incandescent lamp, used for bombing with inert warheads.

Weird Anechoic Room Serves Vital Missile Studies

Black pyramids, like out of this world, jut weirdly from the walls. Silence is supreme. Beneath one's feet, the floor seems to yield. In the center of the room, a white pedestal surmounted by a sphere stands starkly. The atmosphere is awesome rather than strangely scientific.

In this anechoic room, however, studies are being made that are vitally involved with advanced knowledge linked to highly sophisticated missile systems, such as the Sentinel System being developed as a defense against the threat of a surprise attack by the Chinese Communists.

The chamber is 49 feet long, 18 feet wide and 18 feet high. Scientifically designed to be free from noises and vibrations, the Missile Command facility at Redstone Arsenal, Ala., is capable of making highly precise measurements almost impossible in a normal environment.

The black pyramids and the floor are composed of a material which absorbs incident signals, including sound. This also accounts for the resiliency of the floor. Because interference noise is controlled, actual characteristics of a wide variety of targets and antennas can be tested with minimum distortion.

Targets identify themselves by their "signatures," varying in size, shape and other factors. Just as human signatures may be forged or disguised, so may those of the targets, necessitating "detectives" to ferret out those which are deceptive.

Maurice Belrose, Lloyd Root and Sam Dunlap are engineers in the Advanced Sensors Laboratory and members of the Radar Branch Phenomenology Group, which studies the environment in which radar is used to track targets. William Barnes is a microwave technician and, as custodian of the laboratory, is concerned also with designing equipment and setting up experiments.

"The signatures that we get depend a great deal on the radar that 'interrogates' the target," Belrose explained. "This is why a radar's characteristics must be studied, and radars are best studied in a controlled environment such as the anechoic chamber."

The phenomenology group is now preparing to conduct experiments as part of a current project to get signatures on various targets of interest.

Radar components are tested by transmitting controlled signals to the radar "target." When the signal is bounced back, it is recorded and analyzed to determine the radar's performance characteristics under various conditions.

Since the cross-section of the target—its "appearance" to the radar—varies dramatically with small changes in viewpoint, targets are rotated, tilted, or otherwise reoriented to permit study.

Plans are now being made for a larger and still more sophisticated chamber capable of more precise measurements through the use of computers and of full-scale models, and simultaneous measurements of target cross-sections from two angles.

MICROWAVE technician William Barnes positions sphere used in calibrating radar equipment in MICOM's anechoic chamber at Redstone Arsenal.

New Flat Plasma Panel Viewed as Cathode Ray Tube Successor

Joint Services Electronics Program (JSEP) effort between military and academic researchers has developed a flat plasma display panel envisioned as a replacement for cathode ray tubes for computer information display and storage. Application to television may be possible.

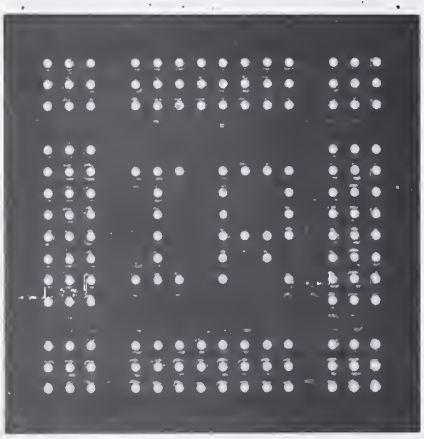
The U.S. Army Electronics Command, Fort Monmouth, N.J., administered the developmental effort for JSEP. Support was provided also by the Department of Defense Advanced Research Projects Agency and the Syracuse University Research Corp.

Three scientists at the Coordinated Science Laboratory, University of Illinois at Urbana, are credited with the invention, intended primarily for multiple readout from computer systems. Drs. D. L. Bitzer, H. G. Slottow and R. H. Wilson teamed in an effort to overcome some of the serious limitations of cathode ray tubes as display devices.

Other than phosphorescence, the cathode ray tube has no memory. Consquently, its images must be regenerated continually and transmitted at video bandwidths to avoid flicker.

Drs. Bitzer and Slottow contend that as an analog device in a digital environment, the cathode ray tube requires signal conversion circuits that are complex and expensive. They cited other limitations such as high voltage and space requirements as less serious but "still significant."

The plasma display combines the properties of memory, display and high brightness in a simple structure relatively inexpensive to fabricate. Since it does not need regeneration, computer output can be fed directly to it over conventional voice-communications systems.



Photograph of newly developed plasma panel illustrates display and brightness properties of invention credited to scientists at University of Illinois.

The scientists emphasized that the plasma display is still under development using small matrices but predict it will fill an important role in the computer technology of the near future.

Development of the plasma display was motivated by the needs of a computer-based education program at the University of Illinois. Each experimental classroom consists of student stations with a television display and a keyset connected to a central computer.

For each station, the computer transmits signals to a storage tube memory and selects a photographic slide that contains the appropriate text for that student. The storage tube and slide are then scanned simultaneously and the superimposed signals are transmitted to the cathode ray tube.

Within several years there may be similar systems with several hundred stations, the plasma display inventors foresee. They say it is not unreasonable to predict that in the future thousands of people in classrooms and even in homes will communicate simultaneously with a central computing facility.

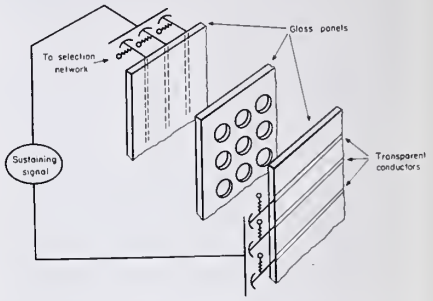
Present computers with their high speed, large memory capacity and steadily decreasing cost per unit operation, the inventors say, are adequate for this kind of service. Display technology, however, has not kept pace with these advances.

The plasma display panel is a sandwich of three layers of flat glass, each approximately six-hundredths of an inch thick. The center "meat" layer is drilled or etched with a rectangular array of tiny holes, to outer surface of each of the outside or "bread" panels bears rows of parallel transparent vapor-deposited gold electrodes.

Outer panels are placed over the center panel in such a way that electrodes are at right angles to each other and intersect over every hole in the meat slice. Voltage passed through the electrodes activates the cells formed by the sandwiched holes.

Since the distance between cells is 25-hundredths of an inch, the cell density is 1,600 per square inch. This contributes to the sharpness and brightness of the image. The name plasma display comes from the gas with which the cells are filled. Helium and neon have both been used satisfactorily as plasma.

The display occurs when cell voltages are pushed beyond a critical



Assembly of plasma display panel.

value by signal voltages transmitted through the electrodes. The memory is achieved by the charges accumulating in the bread slices during pulsed discharges.

Although all displays so far achieved are black and white, the inventors believe that addition of phosphors would make color reproduction entirely feasible.

Soundness of the plasma display principle has been demonstrated at the University of Illinois and confirmed by work at other laboratories.

The development goal now is a large 512-by-512 array for information display. Experiments have been conducted with arrays only 16 by 16, but larger displays are being made and a number of panels with 132-by-132 arrays have been constructed.

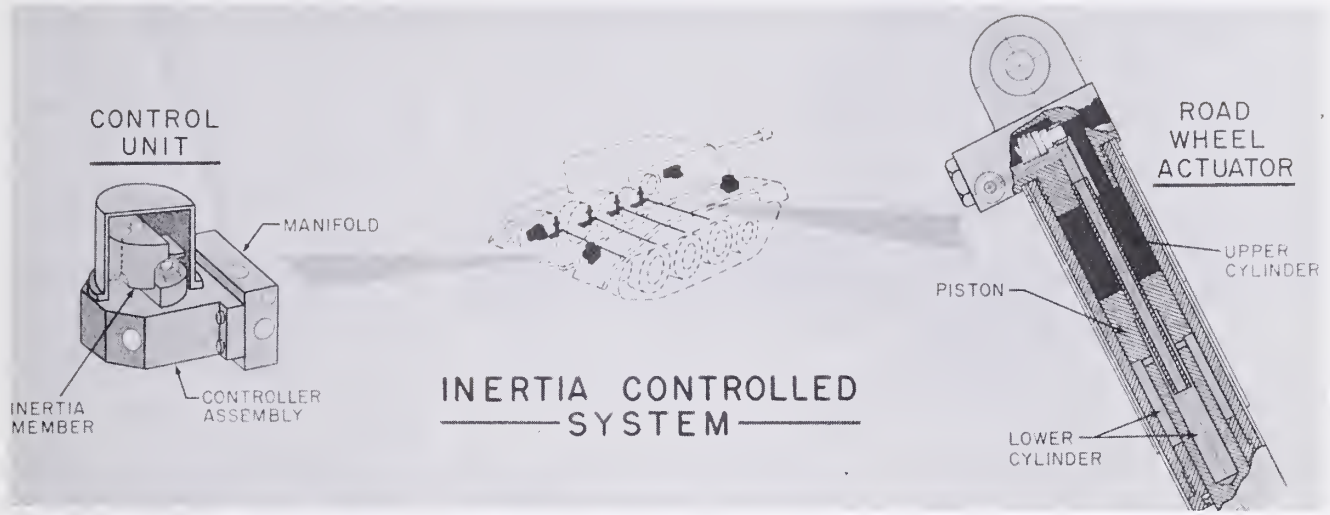
The inventors see many diverse applications of the plasma display principle, such as high-speed printing and nuclear physics instrumentation.

ARPA Appoints Lukasik To Deputy Director Post

Dr. Stephen J. Lukasik has been appointed deputy director of the Advanced Research Projects Agency (ARPA) after serving as acting deputy director since April 1966. He has also served as ARPA's director of Nuclear Test Detection since that time.

Dr. Lukasik was research associate professor of physics at the Stevens Institute of Technology and director of its Computer Center until he became an ARPA executive. From 1955 to 1957, he was a scientist with the Westinghouse Electric Corp., where he performed research in nuclear reactor physics.

He holds a BS degree from Rensselaer Polytechnic Institute (1951) and a doctorate in physics from Massachusetts Institute of Technology.



ATAC Develops, Tests New Type Suspension System

An experimental, hydraulic "semi-active" suspension system for tracked vehicles has been developed and tested at the U.S. Army Tank-Automotive Command's Mobility Systems Laboratory in Warren, Mich.

The inertia-controlled system enables a vehicle to negotiate rough terrain at higher speeds with fewer hull disturbances. Vehicle attitude can be maintained level during lateral slope operations, banking, starting and stopping maneuvers.

The hydraulic portion of the suspension system functions by sensing vehicle hull accelerations and controlling roadwheel travel. The hydraulic inertia controller is mounted rigidly to the vehicle body and is responsive to platform accelerations.

The controller regulates the flow of fluid from a central power source to hydraulic actuators, used in place of conventional shock absorbers. The actuators lift the roadwheels over an obstacle or lower them gently into a hole.

Forces produced by the control actuators are proportional to vehicle body accelerations and opposite to body motion. This results in a major improvement in vehicle ride characteristics and cross-country speed, ATAC engineers report.

Field tests used two M56 full-track vehicles, one equipped with the inertia-controlled suspension and the other with conventional suspension components. Both vehicles were instrumented identically to collect such data as roll and pitch angles, longitudinal and vertical accelerations, roadarm displacements and vehicle speeds.

Test runs were made over a course having a 6-inch, double-amplitude sine wave and a 25½-foot wavelength. Additionally, the vehicles were run over 45-degree-ramped obstacles of 4- and 6-inch amplitudes spaced 20 feet apart in series and as single obstacles.

Comparison of results showed a marked improvement in the ride of the modified vehicle. On the sine-wave course, vehicle pitch amplitude was reduced by as much as 15 percent at 16 miles per hour. Bounce acceleration was reduced by 45 percent and pitch acceleration by 53 percent at 17 miles an hour.

Similar results were noted on the single-obstacle course. At 9 miles per hour, the modified vehicle traveled over the 4-inch bump with a 32 percent reduction in body motion. Comparison of values over the 6-inch series at 9 miles per hour showed a 61 percent reduction in peak downward acceleration at the front, a 66 percent decline in upward acceleration, and a 61 percent reduction in peak downward pitch.

The inertial-controlled suspension system is believed unique in that it is adaptable to existing suspension systems. Cross-country mobility can be materially improved by employment of this system, in the opinion of ATAC researchers.

Top Officials See TOW Score Hits in Benning Tests

Service tests of the TOW antitank weapon system conducted recently before top U.S. Army officials and British and Canadian liaison officers at the U.S. Infantry Center, Fort Benning, Ga., proved successful.

Firing from an M–113 armored personnel carrier, a crew of infantrymen loaded and fired three rounds for direct hits on moving targets. Successful service tests normally precede acceptance and production of a new weapon by the Army.

Prominent observers included Maj Gen John M. Wright, commanding general of the Infantry Center; his deputy, Brig Gen J. S. Timothy; and Brig Gen James F. Hollingsworth, deputy commanding general of the Test and Evaluation Command, Aberdeen Proving Ground, Md.

The U.S. Army Missile Command (MICOM), which manages the TOW program from headquarters at Redstone Arsenal, Ala., was represented by Bill Fielder, technical representa- project manager.

TOW is being developed for the infantryman to use against heavy armor and other battlefield targets. Highly effective against both moving and stationary targets, the system can be carried by troops and fired from a ground emplacement, or mounted on a variety of vehicles.

Col James N. Lothrop is TOW project manager.

GUNNER Sp/4 Bob Clifton fires one of three rounds for direct hit on moving target during recent TOW service tests at U.S. Army Infantry Center.

Lt Col L. D. Dotson

Lt Col W. C. Glisson

Maj W. H. Edwards

OCRD Announces 3 Officer Assignments

Only three new personnel were assigned to the Office of the Chief of Research and Development since the previous edition of the *Army R&D Newsmagazine*, the lowest number in one month during the past year.

LT COL LARRY D. DOTSON is assigned to the Electronics Branch, Communications-Electronics Division.

From November 1967 to January 1968, he served in Vietnam as S–3, 145th Combat Aviation Battalion and commanding officer of the 68th Assault Helicopter Co. He returned with the Air Medal with V device and 27 Oak Leaf Clusters (OLC).

Lt Col Dotson has served as a staff officer in the Communications-Electronics Division, HQ U.S. Continental Army Command; as signal adviser, Army Section, Military Assistance Advisory Group Pakistan; and as project officer with the U.S. Army Electronic Research and Development Laboratories, Fort Monmouth, N.J.

He received a BS degree in electrical engineering from Texas A&M College in 1953 and an MS degree in electrical engineering from the University of Arizona in 1961.

LT COL WILLIAM C. GLISSON, assigned to the Human Factors Branch of the Behavioral Sciences Division has a 1968 MA degree in experimental psychology from the University of Texas. He also has a bachelor of general education degree in psychology from the University of Omaha.

From August 1965 to August 1966, he served in Korea as S–3, 20th Brigade, 7th Division. Prior to duty in Korea, he attended the Command and General Staff College (C&GSC), following 30 months as an instructor at the U.S. Army Infantry School, Fort Benning, Ga.

His decorations include the Bronze Star with V device, Bronze Star (meritorious), the Purple Heart, and the Commendation Medal with Oak Leaf Cluster.

MAJ WILLIAM H. EDWARDS was assigned to the Combat Support Branch of the Air Mobility Division upon returning from duty as a staff officer with HQ 34th General Support Group in Vietnam.

He attended the C&GSC in 1966, following a year as an aerospace engineer with the U.S. Army Aviation Test Board, Fort Rucker, Ala. During the past 10 years he has compiled more than 2,500 hours as a senior Army aviator.

Maj Edwards graduated in 1955 from the U.S. Military Academy and received an MS degree in mechanical engineering from the University of Illinois in 1962. His decorations include the Army Commendation Medal and the Bronze Star Medal.

Hyman Becomes BESRL Deputy, Division Chief

Appointment of Dr. Aaron Hyman as deputy director, Human Performance Experimentation, U.S. Army Behavioral Sciences Research Laboratroy, Washington, D.C., has been announced by Dr. J. E. Uhlaner.

The BESRL director said Dr. Hyman also will serve as chief of the Combat Systems Research Division (CSRD), succeeding Dr. Philip J. Bersh, who resigned to accept a position on the Temple University staff. The CSRD is one of five BESRL division conducting behavioral science and operations research.

As one of three deputy directors of BESRL, Dr. Hyman is responsible for planning research on general behavior functions which are important to military performance and are common to a number of Army jobs.

As chief of the CSRD, Dr. Hyman will organize, direct, coordinate and facilitate implementation of an Army-wide program of behavioral science research related to human factors in combat systems. He will have direct supervisory responsibility for BESRL work in problems of monitoring performance, combat communications and night operations.

Dr. Hyman until recently was research section head for human factors at the Sperry Gyroscope Division of the Sperry Rand Corp. He managed human factors programs for complex man-machine systems, designed and supervised applied psychophysical studies, and developed experimental apparatus and methodologies for vision research.

From 1956 to 1963, he was a research psychologist at the Aerospace Medical Research Laboratories at Wright-Patterson Air Force Base, Ohio. When he left, he was chief of the Presentation of Information Branch of the Behavioral Sciences Laboratory.

Dr. Hyman earlier taught graduate courses in experimental psychology at Columbia University. He holds BS and MS degrees from the College of the City of New York and MA and PhD degrees in psychology from Columbia University.

He is a member of the American Psychological Association, the Optical Society of America, the Human Factors Society, the American Association for the Advancement of Science, the Society of Sigma Xi, and has been a member of the Armed Forces-National Research Council Committee on Vision.

Dr. Aaron Hyman

VE Saves $1.1 Million By Artillery Fuze Design

Value engineering studies on conversion of artillery fuzes for the 105mm and 155mm howitzer shells at Frankford Arsenal, Philadelphia, Pa., have yielded savings of $1,164,780 validated by the Army Audit Agency.

Conversion of the XM563E2 fuze to the XM563E3 resulted when two value-oriented project engineers adapted a simplified safety mechanism developed for a similar fuze, the XM592.

The new design significantly reduced the number of parts and mechining processes, and also greatly improved the fuze. A less complicated straight setback system developed in lieu of angular acceleration eliminated the threat of potential ballistic failures.

Cost of the safety mechanism formerly was $25.46. The new cost is $7.17, a unit saving of $18.29 on each of 63,684 fuzes purchased.

Army Supports AINA Alaska Mountain Study

Environmental field studies in the St. Elias Mountains on the Alaska-Yukon border by the Arctic Institute of North America (AINA), supported partially by the Army Research Office, Durham (ARO-D), N.C., will be conducted from mid-May to September.

This the third year of Army cooperation in the AINA High Mountain Environment Project. It evolved from Arctic Institute experience in the Icefield Ranges Research Project started in the area in 1961.

AINA officials report that interest in additional cooperation in the 1968 research program has been expressed by such agencies as the U.S. Army Institute of Environmental Medicine (ARIEM), Natick, Mass.; the Cold Regions Research and Engineering Laboratories (CRREL), Hanover, N.H.; Natick (Mass.) Laboratories; Army Aeromedical Research Unit, Fort Wainwright, Alaska; and the Institute of Aviation Medicine of the Canadian Forces, Ottawa, Ontario.

The 1966 ARO-D grant to AINA was primarily for reconnaissance and examination of the general area of the Chitina River Valley, Skolai and Chitistone Passes, Mount Bona and Mount Logan to find sites for environmental, physiological and operational research.

The 1967 program concentrated on the Chitistone Pass and extended over a zone from the Chitistone Glacier to the north side of the Skolai Valley between the Russell and Frederika Glaciers.

Arctic Institute scientists plan to occupy again the laboratory established in 1967 at the 17,300-foot level of Mount Logan, Canada's highest with a peak of 19,850 feet. Mount Logan is second highest in North America, ranking behind Alaska's Mount McKinley of 20,300 feet.

Full understanding of the total environment of the Chitistone Pass is the main objective of the AINA-Army project this year. Current investigations will extend and amplify some of the work already started in meteorology, climatology, geomorphology and botany.

AINA's principal investigators this year, as in 1967, are Dr. Melvin G. Marcus (climatology and glacier hydrology) and Dr. Thomas R. Detwyler (plant geography and geomorphology). Both are with the Department of Geography, University of Michigan. Other team members had not been named at press time.

AINA mountain laboratory established in 1967 at the 17,300-foot level of Mount Logan, Canada's highest peak.

DA Studying Best Mix Of Vehicles for Future

REVAL-WHEELS, a Department of the Army study group, is re-evaluating the tactical vehicle program of the Army, to determine "the best mix of tactical vehicles for the time period 1968–1975."

Maj Gen John K. Boles Jr., assigned to the Defense Communications Planning Group, Defense Communications Agency, is chairman of the REVAL-WHEELS Group. The study is an analysis of vehicle requirements, vehicle load data, and type of tasks to be performed by each variety of wheeled vehicle. Key input data is being furnished by the U.S. Army Combat Developments Command (USACDC), Fort Belvoir, Va.

Data from USACDC agencies is prepared for the computers from unique Task Card Worksheets which include tactical mission, mean distance per sortie, payload, crew, radio requirements, swim capability, armor protection and air transportability.

Within USACDC's Organization Directorate, the TOE Division (Tables or Organization and Equipment), under Col Lucian D. Bogan Jr., monitors the work on the project.

Von Karman Institute Picks Army V/STOL Expert

Technical Director Paul F. Yaggy of the U.S. Army Aeronautical Research Laboratory has accepted an invitation from the famous von Karman Institute in Belgium to give two lectures on V/STOL aircraft aerodynamics, May 13–17.

Yaggy has been director of the Army laboratory at Moffett Field, Calif., since it was established in 1965. One other U.S. representative, W. Z. Stepniewski of the Boeing Co., has been invited to join as a lecturer with distinguished European scientists and engineers.

The course is sponsored by the Advisory Group for Aerospace Research and Development (AGARD) of the North Atlantic Treaty Organization (NATO) in cooperation with the Institute.

Instruction on various aspects of vertical- and short-takeoff-and-landing aircraft will provide select members of a new generation of engineers with up-to-date accounts of V/STOL problems.

Included will be lectures on novel aerodynamic advances, important areas for research and development, and long-term prospects. Nine half-day lecture sessions, followed by general discussion, comprise the course.

Yaggy will conduct sessions on pure and compound helicopters, including stopped or stowed rotors, and flight-testing methods and handling requirements. Stepniewski will conduct a session on convertible rotor propeller aircraft, including deflected slipstream.

Dr. Philippe Poisson-Quinton and Dr. Peter Lazareff of France will lecture on V/STOL concepts and categories, ducted-propeller and large-fan aircraft.

Dr. John Williams of the Royal Academy of Engineers, United Kingdom, will speak on turbojet and turbofan aircraft and will close the formal lecture periods with "Mission Requirements, Implications and Competitive Designs for Future Developments."

Germany will be represented by Dr. Henry Thomas, lecturing on BLC (boundary layer control) and circulation control of STOL aircraft.

Paul F. Yaggy

Yaggy has gained international stature as an expert during more than 22 years experience in low-speed aeronautics and aerodynamics. He was an aeronautical research scientist with NASA for 19 years before assuming his present position.

Educated at the University of Notre Dame, Taylor University and San Jose State College, he is a member of technical committees of the American Institute of Aeronautics and Astronautics, the Society of Automotive Engineers, the American Helicopter Society, the NASA Advisory Subcommittee for Aircraft Aerodynamics and the Fluid Dynamics Panel of AGARD.

RDT&E, Purchase Contracts Exceed $314.5 Million

Army contracts for research, development, test and evaluation and procurement of related materiel, each totaling in excess of $1 million, aggregated $314,549,217 Feb. 10 to Mar. 8.

Olin Mathieson Chemical Co. received a $35,720,958 modification for operation of an Army ammunition plant at Charleston, Ind., for production of propelling charges and related items and a $4,156,852 contract for loading, assembling and packing 20mm incendiary cartridges.

Five contract modifications and definitizations totaling $27,293,509 will procure from the Raytheon Co. telephone signal converters and multiplexers, parts for 750-pound bombs, test equipment, gauging, industrial engineering services and group support items for the Hawk missile system.

Bell Aerospace Corp. received a $20,752,354 initial increment to a $123,086,647 5-year buy of light observation helicopters and a $3,310,368 order for UH-1 helicopter rotary wing blades.

Eight contracts totaling $20,539,786 with General Motors Corp. will procure transmission units and assemblies, turboshaft engines for helicopters, diesel engines, delivery trucks, breech mechanism assemblies for gun/launchers, and projectile body and band assemblies.

AVCO Corp. will supply $19,069,698 for helicopter engines and ammunition components. National Gypsum Co. was awarded a $17,961,860 modification for loading, assembling and packing 105mm and 81mm projectiles and fuzes.

Day and Zimmermann, Inc., will receive $17,736,221 and Harvey Aluminum Sales will get $15,366,031 for ammunition. The A. O. Smith Corp. was awarded contracts totaling $15,359,615 for 750-pound bomb parts.

Hercules, Inc., will provide propellants, explosives and electric blasting caps for $13,670,431, and the Martin Marietta Corp. will furnish Shillelagh missiles for $9,406,576. Continental Motors Corp. received contracts totaling $9,041,538 for multifuel truck engine assemblies and for rebuild and retrofit of recovery vehicle engines.

Dump trucks, tractor trucks, spare parts and diesel engines will be supplied by Mack Trucks, Inc., for $7,116,035. Philco-Ford Corp. received modifications totaling $6,504,167 for electronic equipment, test sets for the Shillelagh missile system, maintenance and operation of the Integrated Wide-Band Communication Sites in Southeast Asia, and for R&D on the Chaparral missile system.

Frequency Engineering Labs of Harvard Industries, Inc., was awarded $5,102,967 for radio sets, General Dynamics Corp. gained a $4,151,538 definitization for radio sets, and Honeywell, Inc., will supply detonating fuzes for $3,919,965.

Teledyne Systems Co. will furnish sets of central computer complex components for use in AH-56A aircraft, and UNeCo, Inc., will supply parts for cartridge fuze components for $3,536,938. Beech Aircraft Corp. gained a $3,258,000 award for modification of U-21A aircraft.

Technical Operations, Inc., received a $3,241,600 modification for scientific and technical support of studies, analyses, and evaluation of war games. Chamberlain Manufacturing Corp. will supply metal parts for projectiles for $2,730,892.

A $2,719,890 contract with Motorola, Inc., is for parts for artillery fuze boosters. LTC Aero-Space Corp. will provide ground-support equipment for the Lance missile system. Mason & Hanger, Silas Mason and Co., Inc., was issued a $2,353,313 modification for production of bombs.

Clevite Corp. won a $2,310,000 contract and Marathon Battery Co. a $2,180,200 contract for dry batteries. Grumman Aircraft Engineering Corp. will provide OV1 Mohawk aircraft and related items for $1,969,113.

A $1,911,441 contract to Brunswick Defense Corp. is for platform utility trucks. United Aircraft Corp. received a $1,896,600 order for blade assemblies for CH-54A helicopters. Ingraham Co. will supply parts for boosters for $1,870,000.

Parts for 105mm cartridge fuze components from Keystone Manufacturing Corp. will cost $1,788,860. Bechtel Corp. received a $1,692,016 contract for architect engineer services for the design of a Sentinel System antiballistic missile radar power plant. Whittaker Corp. will produce igniters for rocket motors for $1,681,090.

Other contracts and modifications are:

ACF Industries, Inc., $1,459,573, assemblies for cartridge fuzes; Chicago Aerial Industries Inc., $1,366,940 for cameras, cone lenses, and carrying cases for lenses; Electro-Optical, Inc., $1,361,388 for night-vision sights; Whirlpool Corp., $1,301,427 for antipersonnel projectiles; and

General Research Corp., $1,291,925 for additional systems research for the Advanced Research Projects Agency; Sargent-Fletcher Co., $1,286,828 for spray tanks; Stevens Manufacturing Co., $1,241,040 for semitrailer shop vans; University of Illinois, $1,200,000 for 12 months of studies and investigations under a joint services electronics program; and

Dana Corp., $1,184,027 for truck transmission assemblies; Amron Corp., $1,178,489 for ammunition components; Cabot Corp., $1,126,872 for forgings for gun barrels; E. I. du Pont de Nemours & Co., $1,072,401 for establishing lead azide manufacturing facilities at the Kansas Army Ammunition Plant; and

National Union Electric Corp., $1,046,400 for metal parts; General Time Corp., $1,030,425 for ammunition fuzes; White Motor Corp., $1,002,282 for engineering services for trucks; Texas Instruments, Inc., and TRW, Inc., $1,000,000 each for electronic equipment.

NEW GROUND SUPPORT equipment to convert Pershing from a wheeled to a tracked system passed initial tests in March when a missile was launched from the Hueco Range at Fort Bliss, Tex., to White Sands Missile Range, N. Mex. Termed Pershing 1-A or P1-A, the improved launcher control equipment is towed by a 5-ton M656 truck. P1-A is designed to strengthen deterrent capability of NATO forces by reducing reaction time and increasing reliability of the Pershing system now deployed in the U.S. and Europe. No changes will be made to the basic 34-foot missile under the P1-A program.

Natick PRL Publishes 12th Program Report

Abstracts describing Pioneering Research Laboratory (PRL) basic investigations during Calendar Year 1967 are compiled in the recently published 12th annual report of the PRL, an element of the U.S. Army Natick (Mass.) Laboratories.

Compiled by Dr. Harold W. Coles, the report carries a foreword by PRL Director Dr. S. David Bailey, explaining that its purpose is to inform Department of Defense and other governmental laboratory personnel of PRL projects and investigators.

Eighty-eight in-house projects are listed in addition to investigations performed by PRL scientists for other Natick laboratories and governmental agencies. Essentially, all basic research and most applied research funds of PRL support in-house laboratory research.

PRL's mission statement fixes responsibility for basic research in support of the Natick Laboratories function of furnishing the best possible food, clothing and general equipment for American soldiers.

The report lists the PRL professional staff members and their areas of scientific specialty, names 11 foreign scientists who contributed to PRL research as visiting postdoctoral fellows, and identifies other scientists who served as consultants and members of advisory committees.

An extensive list of technical papers published or presented by PRL personnel in CY 67 is supplemented by a list of contractors' final reports and publications. The report includes seminars and scientific meetings conducted at the PRL organizational structure, and patents issued to PRL scientists.

PRL investigations for other Natick laboratories and defense agencies covered a broad range of effort, including research using the NLABS solar furnace, the NMR spectral service, and thermal conductivity measurements of spacer materials.

This phase of activity also dealt with properties of materials under high rates of strain, mass spectral analysis, elementary analysis, operation of the Food Acceptance Laboratory, consultation with product laboratories on insect control problems, and human factors analysis, consultation and design guidance.

In-house research by PRL scientists included studies in biology, microbiology, proteins, theoretical biology, entomology and sensory physiology.

In the physical sciences, investigations involved polymers, photo and radiation chemistry (including five studies utilizing flash photolysis), analytical chemistry (including mass spectral data processing and compilation), food chemistry, chemical synthesis, energy transfer and radiation physics.

The report also lists eight basic research projects in experimental psychology and psychophysiology. Applied research was performed in microbiology, insect and rodent control and psychology.

Several abstracts point out the practical or potentially practical application of the research findings to military requirements. For example, the first abstract on enzymes research, titled "Cellulase for the Production of Glucose," summarizes the significance of findings by stating: "The practical conversion of a common waste to a usable food has moved one step nearer reality."

Picatinny Doubles Enlisted Scientists Force

Under the Department of the Army Scientific and Engineering Assistants Program, Picatinny Arsenal has acted to relieve a critical shortage of engineering personnel by gaining approval for 38 additional enlisted men, raising the total to 74.

The Dover, N.J., installation has participated in the ASEA Program since the early 1950s and has found that the enlisted men with at least bachelor's degrees in scientific fields or engineering have been able to make valuable contributions to research and development activities.

Standards for selection to the ASEA Program are expected to be continually upgraded through the recently announced changes in the Selective Service Act that will result in induction into the Army of large numbers of personnel with bachelor's, master's and PhD degrees in the scientific and engineering fields.

With the Picatinny Arsenal allotment more than doubled by the recent addition, the current complement of 74 ASEA personnel is representative of 425 years of undergraduate and graduate college education and more than 100 years of technical experience.

Twenty-eight of these are mechanical engineers, 24 mathematicians, 9 are physicists, 8 are electrical engineers, and 5 are chemical engineers.

Working side by side with civilian scientific and engineering personnel, the professionally qualified enlisted men frequently propose imaginative and highly resourceful developments in ammunition technology.

Scientific and engineering enlisted personnel have made a number of signal advances in Picatinny Arsenal's R&D program. Sp/5 Bernd W. Kliem, for example, was recognized for outstanding service when President Johnson awarded to him the Army Certificate of Merit.

Specialist Kliem and Adolph Wronka, an industrial engineering technician, worked as a team to develop a greatly improved design for an aircraft rocket, resulting in phenomenal savings to the U.S. Government.

PFCs John Wicklund and Kenneth Unklesbay are assigned to certain phases of a TFD (tactical fighting dispenser) and XM47 aircraft mine dispensing unit. PFC Wicklund has a BS degree in physics and an MS in electrical engineering from Kansas University. PFC Unklesbay received BS and MS degrees in mechanical engineering from the University of Missouri. His objective is a PhD degree, for which he studied one semester prior to his arrival at Picatinny.

PFC Wicklund's specialty encompasses the circuit design on the TFD. PFC Unklesbay is the production project engineer on the explosive train which is part of the canister for the TFD.

Working on phases on the TFD and XM47, an aircraft mine dispersing system which provides for emplacing antipersonnel mines (XM-27) from fixed- or rotary-winged aircraft, they have found the assignment a challenge to their professional skills.

PICATINNY scientific and engineering military personnel, Pfc John Wicklund (left) and PFC Kenneth Unklesbay perform electrical checkout on XM48.

Military Geographic Intelligence Research and Development

By Dr. Kenneth R. Kothe

Military Geographic Intelligence (MGI) provides information on the physical aspects, resources and man-made features of land areas that is immediately or potentially significant to military planning and operations.

MGI is the product of collection, evaluation, analysis, integration and interpretation of information concerning vegetation, terrain factors, lines of communications, highways, conditions in urban areas and many other factors.

The mission of the U.S. Army Engineer Topographic Laboratories (formerly the Geodesy, Intelligence and Mapping Research & Development Agency), Ft. Belvoir, Va., includes research and development of subsystems for complete collection and processing of terrain data for strategic and tactical use within a total system concept.

This work is supported by such major agencies as the U.S. Army Waterways Experiment Station (WES), Vicksburg, Miss., and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), Hanover, N. H.

The MGI research starts with the identification of the environmental and cultural data elements which affect U.S. Army and enemy operations, Army planning and, indirectly, Army research and development.

Data collection ranges from generalized information, normally included on a topographic map for planning and operations, to extremely detailed information on items such as bridges, soils and port facilities. Weather and climate are important as well as such items as construction materials, fuels and electrical power.

The terrain data system output must be tailored to the needs of the user, with respect to flexibility in scale, resolution of detail, and reliability, currency and completeness of outputs.

Future Systems Concept. The terrain data must be linked quantitatively to its military effects in realistic models. The system of the future must be highly automated, fully integrated, man-machine system providing rapid answers to questions such as the siting of airfields, loading zones, supply dumps, and staging areas.

Routine operation includes minimal production of hard-copy output to meet established requirements while an extensive data collection program is in operation to provide up-to-date information for the automated data base. Sources include maps, remote sensor imagery, and scientific and intelligence reports.

When a requirement is established, Operations Control (OC) compares the requirement against the data base. If available data and programs can provide a satisfactory response, output is approved for distribution.

If the data is inadequate, Operations Control 1) initiates a new collection requirement, 2) directs an analyst to provide best response using available data, and 3) updates the response when new data has been collected.

If there is sufficient data but suitable analytical models have not been programed, then OC 1) directs a manual data analysis and 2) establishes a requirement for modeling the analysis to provide automated programs for future use.

The current military organization requires that several systems be considered: a mobile one in direct support of the Army in the field; a semimobile base plant operation at theater level; and permanent base plant facilities within CONUS. Security requires another data system in general support at each echelon.

The USAETL is currently in the exploratory development phase of its MGI Project, established in 1965 after many years without a significant increase in the Army's capability to produce terrain intelligence.

The approach is divided into a short-range upgrading of production capabilities from "off-the-shelf" hardware and procedures, and a long-range goal of major advances in the state-of-the-art.

The laboratories demonstrate feasibility of new systems approaches to collect, extract, process, store, disseminate and update terrain data.

Concepts are developed for integrating these functional subsystems into the three systems for the Field Army, Theater Army and CONUS operations.

Multiband Photography and Radar. Tests of color and infrared films have demonstrated their superiority over black and white film for the interpretation of environmental and cultural data. Research indicates that broader spectral sensitivity can be optimized in a selective multiband photographic approach in future acquisition systems.

The feasibility of several advanced color collection methods based on holography has yet to be demonstrated. However, with color corrected optics, a superior color and multiband photographic system could be put in the field in a relatively short time.

The Air Force 665A (AN/APQ-73) (XH-4) coherent side-looking airborne radar (SLAR) was calibrated as a research tool to demonstrate feasibility of advanced systems with increased capability for optical or electronic signal processing.

Calibration of operational SLARs for increased utility is a short-range goal; the long-range objective is multiband broadband radar with comparative signal analysis and color-coded output display.

The USAETL is also investigating an advanced capability to correlate, compare and analyze multiband photographic, SLAR and infrared-scanner imagery, developed by the Center for Research and Engineering Science (CRES), University of Kansas.

USAETL has demonstrated that electronic signal processing of the radar signal return has a greater potential than processing the radar image film. Modifications to the radar signal processor must be made for further analysis.

It is believed that an airborne, low-level route reconnaissance capability using lasers is feasible for the mapping of a variable swath of tertain, with 6-inch contours if desired. Breadboard modeling of such a device

Dr. Kenneth R. Kothe, chief, Geographic Systems Division, U.S. Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Va., directs the Military Geographic Intelligence Research and Development Program.

Upon graduation from the University of Cincinnati in 1954, with a BS degree in geology, he served as an engineer officer in the U.S. Marine Corps. Kothe graduated from Cornell University with a PhD degree in 1960. Before joining USAETL, he worked in geophysical prospecting for oil and later as a terrain analyst with the Military Geology Branch of the U.S. Geological Survey.

to demonstrate feasibility is planned in the near future.

Automatic Photo Data Extraction. In 1963, Aeronutronics, Inc., demonstrated that environment and cultural data could be identified and delineated from black and white aerial photography through optical masking techniques. An experimental Natural Image Computer (NIC) has since been built to simulate the procedures. This device identifies, tracks and extracts from aerial photography items such as airfields, roads, tank farms, orchards, woods and streams with a high level of reliability.

The experimental NIC is a digital computer-scan device programed to simulate optical masking-decision techniques of an optical parallel processing device. Additional research will verify the concept of approach.

While this exploratory development model of the NIC was being built, the USAETL also tested an adaptive learning device called CONFLEX, built for the Air Force by Scope, Inc.

Using photographic inputs, this device is able to learn and identify a selection of cultural and terrain features. Limits of scale, translation and rotation were determined and a method to minimize their effects was developed.

From this research a concept for a future NIC-CONFLEX data extraction system has been developed. In this, the next generation CONFLEX will scan the photography, identify the features present and determine the programs the NIC should apply.

The Data Base. The core of an integrated terrain data systems, is the structure and organization of the data in the storage and retrieval subsystem. USAETL is developing the structure of the terrain data base to fit Army requirements.

Included in this effort is a review of the intelligence data handling systems, as being developed by the Defense Intelligence Agency, the Air Force, and the Navy. None of these agencies has as extensive requirements for terrain data as the Army.

Under direction from the U.S. Army Combat Developments Command (USACDC) the Engineer Topographic Laboratories has analyzed the terrain intelligence input requirements of the Automatic Data Systems for the Army in the Field (ADSAF) and has developed a concept for terrain data handling within the Field Army in the automated ADSAF environment of 1975. This concept is now being staffed for Army approval.

The automated storage and retrieval of point and line data is, of course, no major problem. However, the automated storage and analysis of areal data, such as soils, vegetation or land use, has not been effectively accomplished. A major problem is to develop the data base with quantitative descriptors that link terrain data with military effects. The Waterways Experiment Station and other laboratories have developed terrain effects models for mobility site selection, communications, and other applications.

A preliminary evaluation of the Canada Land Surveys system indicates it may be a feasible approach for the storage, retrival and analysis of areal environment data suitable to the U.S. Army's base plant requirements. A test of the capability of this system to process and analyze U.S. Army Engineer Waterways Experiment Station terrain factor maps will be attempted in the near future.

Products, Readouts and Displays. The development of optimum MGI products, readouts and displays is not a minor problem. New products, such as those from side-looking airborne radar, have been developed. Although of considerable impact, such applictions of new collection devices with their resultant products is only a minor part of the output problem.

Existing topographic maps and MGI products must be evaluated against the Army's present and future requirements for terrain data at each echelon under various concepts of operation to identify deficiencies and areas of improvement.

Evaluations will provide the basis for future development of hard-copy maps and other terrain presentations, including readouts and displays of an automated terrain information system.

(*Continued on page 30*)

Dike Design Research Saves $500,000

Research to determine optimum design of dikes to regulate the lower Mississippi River low-water navigation channel, conducted at a patamological model test facility at the U.S. Army Waterways Experiment Station, has saved an estimated $500,000 in two years.

Approximately $100 million worth of proposed dike construction at current costs in involved. Dikes have been used extensively throughout the world for many centuries, but few basic principles have been developed to aid engineers in designing structures scientifically for requirements.

Variations in problems of regulation of alluvial rivers and streams, due to changing flow conditions, are so complex that it is generally impractical to evaluate properly the performance and effectiveness of alternative types and layouts of dike systems on the basis of field experience alone.

Army engineers estimate that about 1,000,000 linear feet of dikes will be needed to control the low-water navigation channel of the Mississippi River between Cairo, Ill., and Baton Rouge, La. Currently, the cost of dikes averages about $90 a foot.

Because of the large expenditure involved, the Mississippi River Commission at Vicksburg decided to investigate methods of achieving a design of dikes to meet specifically the widely varying needs. Among questions for which answers are desired are:

- How does degree of dike permeability affect fill between dikes and scour along the ends?
- What are the optimum crest elevations of pile dikes and stone dikes with respect to the planes of low, mean and bankfull flows?
- What are the advantages or disadvantages of horizontal, sloping and stepped-dike crests?
- What are the advantages or disadvantages of dikes placed normal to flow, slanted upstream and slanted downstream?
- What consideration should govern the spacings between dikes of different types?

Results of the potamological model studies to date have produced many new concepts for use in design of stone dike systems. As new ideas evolve, they are included in design considerations of prototype dikes.

Investigations have not progressed sufficiently to permit development of design criteria for all alluvial rivers, but Army engineers are of the opinion that construction savings of about half a million dollars in two years plead a strong case for continuation of the studies.

VIEW OF MODEL test facility (looking "upstream") at Army Waterways Experiment Station, Vicksburg, Miss.

Military Geographic Intelligence R&D

(*Continued from page 29*)

Because the natural and cultural environment is always changing, out-of-date MGI information may be wrong or misleading. The problem becomes one of change detection. The Engineer Topographic Laboratories have been active in this area and future systems are expected to provide a feasible solution to high-resolution change detection.

Since area priorities will always be important because reconnaissance and production capabilities are limited, research has been initiated to analyze the rates of change for environmental and cultural factors in various areas of the world to determine updating schedules.

Future Program Direction. Actions are now under way to address the urgent need to upgrade the Engineer Terrain Detachment capability to provide Army units in South Vietnam the data required for modern concepts of military operations.

The immediate problem of terrain data handling within the Defense Intelligence Agency has been analyzed and possible solutions have been identified. A state-of-the-art concept for exploitation of capabilities in general support of existing systems is currently being developed.

As a result of demonstrated feasibility in new collection capabilities, data extraction, data base development and products, readouts and displays, the Military Geographic Intelligence Project is now being restructured to move into the Advanced Development phase for future base plant capabilities in CONUS, Theater and Field Army echelons. In addition, a new geographic research project is being established to provide long-range support for the Army's terrain information requirements.

Marine Officer Authors ASC Paper

A U.S. Marine Corps officer assigned to the joint U.S./Federal Republic of Germany Main Battle Tank (MBT–70) Program, has authored one of 96 technical papers programed for presentation at the 1968 Army Science Conference, June 18–21, at the U.S. Military Academy, West Point, N.Y.

Lt Col Col Warren L. Ammentorp, a U.S. Marine Corps liaison officer, is assigned to the U.S. Element of the MBT–70 Joint Engineering Agency as director of Military Requirements and Human Factors Engineering. The Joint Engineering Agency is located at the General Motors Tech Center, Warren, Mich.

Titled "MBT–70 Mission Profile," his paper will give a life-cycle description of the anticipated role of the MBT–70 and its crew. Its purpose is to provide engineers and designers with a specific guide or common yardstick that spells out in detail the requirements of their respective areas of engineering and development.

Girls Outnumbered 11 to 1 in ECOM Program

Two Northeastern University students are the only girls among 24 participants in the U.S. Army Electronics Command (ECOM) Cooperative Education-Employment Program.

Interest of Karen Moyes in the program may be traced to her father, Edward Moyes, an electronic engineer in an ECOM laboratory. Margaret Sedlak is the daughter of another former ECOM employee, the late Michael Sedlak, and is aiming to be a full-time employe after graduation.

Assigned to the Information Acquisition Technical Area of the Communications-Automatic Data Processing Laboratory, Margaret is in her sophomore year at Northeastern University as a mathematics major. She is shown at work (top left) at a desk calculator, analyzing data accumulated for an experiment in cutaneous communications.

Karen is a chemistry major in her junior year, and has accumulated 12 months working time at Fort Monmouth. Her project in the Power Sources Division of the Electronics Components Laboratory involves research on high-density batteries of a type that may eventually find civilian application in electric automobiles.

Aimed at combining practical experience with academic learning, the ECOM program includes "co-op" agreements with Pratt Institute, Drexel Institute of Technology, Virginia Polytechnic Institute, University of Akron, University of Detroit and Northeastern. Co-op students attend college for five years, alternating work and study terms during the middle three.

NASA Deputy to Keynote Conference on Electronics

Challenges and pressures of the times, including a featured address on "Underdeveloped America—The 'Social Software' Problem," will be considered at the 18th annual Electronic Components Conference, May 8–10, in Washington, D.C.

Dr. Thomas O. Paine, deputy administrator for the National Aeronautics and Space Administration, will give the highlight address at a banquet May 9. The conference is sponsored jointly by the Electronic Industries Association, the Parts, Materials and Packaging Group of the Institute of Electrical and Electronic Engineers, Inc.

Robert A. Gerhold, deputy chief of the Integrated Electronics Division, Electronic Components Laboratory, U.S. Army Electronics Command, is the conference general chairman. Last year he was vice chairman.

Discussions and presentations of technical papers will focus on materials, processes and techniques that will provide the base for future electronic circuit capabilities. Consideration will be given to the impact of component trends and requirements of the design engineer.

Two technical sessions will be concerned with thin-film elements and their thick-film resistive and capacitive counterparts, circuit packaging, and interconnections; also, materials, resistive and inductive devices, filters and integrated components.

Three panel discussions are scheduled on microminiature interconnections, ceramic substrates and computerized design of artwork and documentation.

DMIC Continues at Battelle Under $1 Million Contract

Continued operation of the Defense Metals Information Center (DMIC) at Battelle Memorial Institute's Columbus (Ohio) Laboratories is the basis of a $1,060,000 contract awarded recently by the U.S. Air Force.

The DMIC is sponsored by the Department of Defense and administered by the Air Force. It analyzes current information on metals of special importance to the defense system and supplies it to U.S. Government agencies and their contractors and suppliers.

In addition to answering individual inquiries, DMIC publishes information regularly on properties and processing of metals for defense.

Heliborne Gear Suppresses Fire, Recovers Crashed Fliers

A heliborne fire-suppression system designed for quick recovery of personnel trapped in crashed and burning aircraft has been successfully evaluated at Fort Rucker, Ala., home of the U.S. Army Aviation School.

Flown on a UH-1D helicopter, the system consistently allowed aeromedics to remove dummies from fire-engulfed wreckage in about 30 seconds. Quick extraction of pilots and passengers would greatly increase their survivability chances in many instances.

Some 60 experimental fires during a recent 3-week period were used at Fort Rucker to evaluate the system's feasibility. It was flown in controlled pit fires and under remote field conditions.

An additional 25 fires earlier had been used in tests at Fort Worth, Tex., facilities of the Bell Helicopter Co. Tests were conducted jointly with the Army.

A UH-1D or H model helicopter is equipped with a fire-suppression kit that includes two 25-gallon tanks containing a special "light water" concentrate mixed with plain water; a telescoping boom for discharging the resultant foam; emergency extraction equipment, and evacuation provisions for three litter and two ambulatory patients.

The helicopter, manned by a pilot, copilot and/or crew chief, senior medical aide and a firefighter, hovers at the edge of the fire in a crash, allowing the aeromedic firefighter team to descend to ground by ropes.

HELIBORNE FIRE SUPPRESSION and Rescue technique involves air-drop of aeromedic (center) from helicopter which begins spraying foam to open path into burning hulk. In tests to date, removal of dummies from fire-engulfed wreckage has been accomplished in 30 seconds. *Bell Photo*

Simultaneously, the pilot, operating the movable boom, begins applying foam, opening an approximately 15-foot-wide path to the burning craft. The crash rescue team follows the path and pulls aircraft occupants to safety.

The firefighting ship then reverts to its original role as a medical evacuation aircraft. In-flight treatment is given to the injured en route to hospital facilities.

R. S. Stansbury, Bell project engineer, said the system is designed to handle fires on light-to-medium size aircraft, with fuel spills of up to 200 gallons over a 1,000-square-foot area.

The experimental configuration places the boom and primary 25-gallon tank on the helicopter's right side to give a pilot visual coverage of the operation. A second 25-gallon tank for 100 percent reserve is on the left side.

A production version of the system would place both tanks inside the ship, at the aft section of the cargo compartment. The user also would have the option of utilizing 50-gallon tanks if desired.

Light water concentrate is used in a six percent solution with 94 percent water to produce the fire-smothering foam. The chemical is fed into the boom and through a nozzle by a low-pressure system continually charged by bleed air from the compressor section of the helicopter's engine.

An additional safety feature of the system is the elimination of the 3,000 psi (pounds per square inch) pressure vessel, which is always a potential "bomb" if ruptured.

The control for chemical discharge is on the pilot's cyclic stick. Rotor downwash effectively carries the resultant foam down and forward for application on the fire. Boom azimuth from 0 degrees to 80 degrees and telescoping from a basic 9.4-foot to 16-foot length are controlled by the pilot.

Communications between the pilot and rescue ground crew is maintained by a transceiver installed in the inner liner of each firefighter's hood. Each radio has a special voice-operated microphone to eliminate the need for pushing a switch to talk to the pilot or each other. This frees both men's hands for aircraft entry and personnel rescue.

Army officials envision the personnel and kit to serve as supportive equipment for airmobile combat operations, training missions and normal flight routine.

The system also has civilian application for use at airports. The heliborne operation has an advantage over firefighting trucks in that it can be used over a wide area, including remote sites inaccessible to trucks.

POTENTIAL OF FIRE-FIGHTING FOAM for military operations and riot control was reviewed recently by Army and civil authorities at Edgewood Arsenal, Md. Two volunteers and retired Army Maj Gen Bryan Lee Milburn (center) ware through snow-like foam during demonstration by Dr. Aristad V. Grosse, president of Temple Research Institute. Expansion ratio of the mixture (foaming agent and water) is approximately 1:1000. General Frank S. Besson Jr., CG Army Materiel Command, and Lt Gen William F. Cassidy, Chief of Engineers, were among 25 Army officers present. The system is a product of Walter Kidd Co.

Personnel Management for Research and Development

(*Continued from page 2*)

What is the problem in this business of personnel administration? Is it a matter of size? Is it lack of authority? These are components of the problem, but they are magnified by what I consider one of the major problems—many personnel people consider personnel matters as *solely* in their domain. They fail to recognize that managers of technical organizations are intimately involved in the personnel business.

The R&D managers create the technical climate. They set goals and assess performance, and they must guide and motivate their people toward those goals. We must remember that the R&D manager is responsible for the ultimate success or failure of technical ventures and the laboratory itself. So it's very clear that an important role of the personnel specialist is to provide expert assistance so that these goals can be achieved.

Let us compare, for a moment, my own experience as an R&D manager in industry and a typical DoD laboratory director. As a manager of industrial R&D, I was given certain financial and technical objectives to achieve each year, a budget within which I had to operate, and a great deal of authority to carry out technical operations. If I did not meet the objectives, the penalty was spelled out, or at least understood—fired or shelved. The incentives for achieving or exceeding them were also well understood.

I was part of a larger organization and therefore had to interact with forces and situations outside my own domain. We had a check-and-balance system like the government's, but I believe we had more emphasis on the "balances" and less on the "checks." I had ready access to the policy level, which is more possible in a smaller organization, and I could always have my day in court. This doesn't mean that I didn't lose a few appeals, but the opportunity to appeal was there.

Probably one of my greatest management flexibilities was that I could make the hire and fire decisions and had the authority to deploy my technical resources rapidly to meet new situations. In implementing this system, naturally I had to work closely with our personnel people, but our personnel systems were relatively simple. They were the experts on salary structures, recruiting techniques and similar specialties.

We worked together using the profit and loss statement as our principal guide. That is what we were judged on. That's how one advanced, not just by living within the system. We had to satisfy our customers to survive. Our personnel office was motivated toward these objectives, because everyone gained from being associated with a profitable organization.

In looking at the U.S. Government organization, I realize that we have no profit and loss statement, nor can we have one. But, more important, there is also a fundamental difference that can be formulated as follows: What is the optimum tradeoff point between maximizing organizational performance, in the way that corporations tend to do, and maximizing the protection of employe rights, in the way that the U.S. Government Civil Service merit system tends to do?

An industrial group can, and is often willing to, hire and fire people, based upon "hard-nosed" criteria for improving the organization's effectiveness in achieving a specific goal. Without question, this may produce an occasional unfair or premature action from the ideal personnel administrator's perspective. We must remember, however, that the objective is *always* quality improvement.

On the other hand, my observations are that the U.S. Government tends to develop and apply mechanisms that place great emphasis on tenure and preserving every employe's rights, even though these mechanisms actually reduce the effectiveness of a given organizational unit.

Obviously, there are pros and cons regarding both of these extreme orientations. The problem is to create a healthy middle ground. An employe whose rights are protected, but whose organization is ineffective, may not be any happier than an employe who feels a colleague is being treated somewhat unfairly but who knows he is participating in a highly successful, viable activity.

There are also many other differences that cause problems. In the DoD, scientists and engineers represent only a fraction of the total force, about two to three precent. This is not a complaint, simply a fact. But in most cases they are deeply embedded in an organizational matrix that has much broader responsibilities than just R&D.

The overall personnel system is often operated around the majority. It appears to lack the required flexibility to permit the establishment or maintenance of a creative environment.

Isn't it ironic that in this system we can find situations in which a laboratory manager who has authority to make million-dollar technical decisions lacks the authority, working in conjunction with his own personnel office, to make a thousand-dollar decision on promoting a GS–13 to GS–14 without prior approval by higher authority? Or a technical manager is not permitted to move a GS–12 physicist from one branch to another with-

ASSISTANT SECRETARY OF THE ARMY (R&D) Dr. Russell D. O'Neal fires 50-caliber machinegun mounted on Sheridan tank during tour of U.S. Army Tropic Test Center, Fort Clayton, C.Z. The Sheridan system is undergoing tropic environment testing in the Canal Zone. SFC Robert J. McCorvey, 1st Battalion, 63d Armor, Fort Riley, Kans., a member of the test team, stands behind Dr. O'Neal. The secretary was accompanied by his assistant for research Dr. K. C. Emerson and Col Stanley Y. Kennedy Jr, executive, both of the Office of the Secretary of the Army for R&D, and Lt Col Stanley R. Sheridan, Office of the Chief of Research and Development, Department of the Army.

out getting permission beforehand? Or he cannot make a $4.10 decision to send a technical man to a scientific meeting without going up the line for approval?

Of course, the last example is not a personnel restriction, but perhaps it illustrates the degree of detail that is bogging us down and contributes to the image I described earlier.

When I discussed the matter of personnel flexibility with Chairman John Macy [of the Civil Service Commission] sometime back, he said that we have a great deal of flexibility in the federal personnel system but it just isn't being used by the agencies. I then talked to the agencies, and they put the blame squarely on the Civil Service system.

Finally we told Chairman Macy, "You say there is flexibility in the federal personnel system to provide a better operation. But our personnel people really don't agree. How about sending your representatives into our laboratories, have them talk to the managers and personnel directors, and find out firsthand whether we are using all of the flexibility available within the personnel system?" He did just that—sent his regional directors into 47 DoD laboratories.

We have recently received their report, and we have joined forces with the DoD manpower and personnel people to come up with solutions. From 80 to 90 percent of the problems they identified *are* resolvable within the framework of existing legislation and Civil Service rules and regulations.

Are they not being solved because of ignorance concerning those rules and regulations, or failure to recognize the need for their solution, or satisfaction with the status quo? I don't know. You should be better judges of that than I.

The report cites, in particular, that procedures, controls and administrative devices that are effective for operational and logistical organizations are being misapplied to R&D activities. This is being done in spite of special provisions available within the federal personnel system that are tailored to the unique needs of creative people and work.

To emphasize this, let me quote one of the principal findings in this report:

"The key to laboratory effectiveness is flexibility. It is possible to tailor a system of controls within the Federal Personnel System which is compatible with the need for a creative environment within technical organizations. This can be different from those applied to other organizations.

"The Civil Service Commission has delegated to Federal Agencies the authority to apply a number of special provisions to satisfy the unique needs of research and development. Such authorities should be redelegated to the extent feasible to the lowest level consistent with good management. Better use of the post-audit technique to evaluate and appraise performance would be appropriate.

"There is no reason why we cannot achieve a tailored management system for technical organizations, which is comparable to that of progressive industrial technical organizations and compatible with the Federal Personnel System. The tools are available. All that is necessary is the will to do it." [1]

We of the technical community have identified a long-time urgent need, and the Civil Service Commission says the tools are available. What's the problem, then? I believe that you, as personnel administrators, will have to decide whether you are part of the problem or part of the solution.

Nick Oganovic [Civil Service Commission Executive Director], in his talk on "Improving the Breed" before this same group in 1965, attempted to establish some goals for you. He said.

"What is the most serious complaint about personnel people? The one that I believe is most damaging is that personnel officials are not centers of action, or innovation, and that they do not generate positive solutions to management problems.

"There are too many personnel people who are more concerned about security, the safe course, the easy and familiar way, than they are about getting their teeth into tough problems. . . . We must have a greater degree of boldness; a readiness to

(*Continued on page 34*)

Picatinny Radio Sensor Sets Off Blasts Mile Away

Detonation of explosive charges emplaced as far as a mile away can be accomplished without connecting wires by using a new device developed for Vietnam requirements as a rapid-response instrument.

The XM63 was developed at Picatinny Arsenal, Dover, N.J., by a crew headed by Jack Kalajian, an electronics engineer with the Mine Section, Ammunition Engineering Directorate.

The radio-controlled system can be operated from land, air or under three feet of water. The radio signal is securely coded to pruclude jamming, or spurious or enemy initiations.

In action behind enemy lines, an operator can slip a sensor into an explosive charge in the structure to be demolished, a bridge girder for example, and disappear into the bush. At the desired time the operatory flashes a signal to the sensor to destroy the bridge.

The XM63 consists of a control unit and 10 sensors, each of which can initiate up to five blasting caps. The sensor can be employed individually or in any number up to the 10 with the control unit. Each sensor measures 3 by 7 by 7 inches and weights 5 pounds. The control unit is about 3 by 4 by 15 inches and weighs 7½ pounds.

Ten of the devices are being evaluated in Vietnam and type classification is scheduled for September 1969.

HOUSE ARMED SERVICES COMMITTEE members observed technical demonstrations during tour of Picatinny Arsenal, Dover, N.J. From left are Earl Morgan, committee staff member; LeRoy Meeker, chief, Picatinny's Nuclear Weapons Division; Congressman Russell B. Long (D-Louisiana) Col Roger Ray, Arsenal commander; and Congressman W. L. Dickinson (R-Alabama).

Personnel Management for Research and Development

(*Continued from page 33*)

look at problems in new ways; a willingness to take the chance of making some mistakes ourselves and to tell management about their errors when we think management is mistaken."

I agree with him. Unfortunately, what he said still applies three years later. I wonder if we can find evidence of major improvements! I believe that the past, familiar ways of managing technical people and organization within government has not produced the desired results. Some new, imaginative approaches are needed. I believe that you must ask yourselves, "Are we fostering the delegation of all the flexibility that is available within the system?"

Suppose that a driver in the Grand Prix race is told to win it big and is given all the necessary financial resources, *but* he has to use 80-octane gasoline, can only have one mechanic and no alternate driver, and can't kiss a pretty girl if he wins! We cannot have a situation such as that in our R&D labs.

In these days of specialized management skills, almost all executive actions are cooperative ventures. As specialists and advisers to R&D management, you can help establish desired objectives, plan meaningful personnel and manpower programs, and provide the standards for after-the-fact appraisal.

This would be immeasurable assistance to the line manager. He must not only manage people but must relate people and skills in an integrated way with programed funds, facilities and equipment to accomplish his mission. He must have a degree of authority over people comparable to his control over other resources. He must be guided and helped in his personnel activities by his personnel office, just as he must rely on his procurement, accounting and other staff offices.

We must find ways to delegate more authority over personnel actions to the R&D manager. We must have enough confidence to give him authority over his resources to attain organizational objectives. If he succeeds, let's reward him. If he fails, let him pay the price. But, above all, let's reward him for achievement.

I am vitally interested in this important problem of personnel management. You can help. I would like each of you to give me only 10 minutes of your time in which you ask yourself these questions:

- How can we improve the personnel management of federal laboratories?
- How can we help the laboratory director achieve his objectives more effectively?
- What action can we take to improve the cooperative efforts of personnel and R&D people?
- What controls are now in effect that don't make sense, and what should be done to eliminate them?
- How can we be more effective in getting rid of marginal people.

Then, give me a call or drop me a note with your thoughts and suggestions. I will really appreciate it.

I believe that a model personnel system for R&D organizations can be developed within the U.S. Government framework. It will take much effort, but if we have the will we can succeed. In fact, we cannot afford to fail, for the stakes are too high. And, as you take on these problems, maybe we should remember what George Bernard Shaw said, "Progress is only made by unreasonable men."

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[1] *Report on Problems in the Management of Department of Defense In-House Laboratories* (Washington, D.C.: Civil Service Commission, December 27, 1967).

Civil Defense Centered In Underground Shelter

Emergency shelter against radioactive fallout for agencies linked in Federal Civil Defense Operations for the northeastern United States will be centered in a 2-story, 33,000-square-foot underground building about 25 miles from Boston, Mass.

The U.S. Army Strategic Communications Command-CONUS, Harvard (Mass.) Facility recently moved equipment and personnel into the subterranean structure.

Accommodations are provided for a pre-designated staff of 300 persons for two weeks. The building is equipped with a 30-day food supply, water and emergency power. It has a kitchen, medical and dormitory facilities, and sanitation equipment.

In a national emergency, tenants of the Federal Regional Center would include the Regional Office of Civil Defense, Regional Office of Emergency Planning and members of the Federal Communications Commission, U.S. Army Corps of Engineers and the American Red Cross.

STRATCOM-CONUS personnel operate and maintain more than 40 emergency communications networks using data teletype, telephone and radio equipment.

Israeli Chemist Proving Ability at Edgewood

A former officer in the Israeli Army Scientific Corps and cofounder of a chemical firm in Tel Aviv is recognized as a leading research chemist at Edgewood (Md.) Arsenal.

Harold Z. Sommer has 29 inventions including six final patents, in the medicinal field and is interested primarily in mechanism studies of neuromuscular impulse transmission.

Several of the inventions have been shared with George E. Wicks Jr. and Omer O. Owens, employed with him in the Arsenal's Chemical Research Laboratory.

Sommer has authored 16 technical and professional articles, several of which were published in the *Journal of the American Chemical Society*, *Journal of Medicinal Chemistry* and *Cancer Research*. He is a member of the American Chemical Society, American Pharmaceutical Association and Academy of Pharmaceutical Sciences.

He received his BS and MS degrees from Hebrew University in Jerusalem. An additional BS degree in pharmacy was acquired from Northeastern University School of Pharmacy to "give me a biological and medicinal background for research."

He served in the Israeli Army as a first lieutenant during 1948–49 and was engaged in chemical research with the Scientific Corps. After his service stint, he was cofounder of the Agan, Chemical Manufacturers Ltd., in Tel Aviv. At first he was in charge of development. In 1952 he became general manager and director of the firm which manufactures pesticides and fine chemicals.

Shortly after his arrival in the United States in 1956, he joined the staff of Beanders University, Waltham, Mass., as an associate in cancer research. He moved to Edgewood Arsenal in August 1963.

Harold Z. Sommer

SATCOM Units, AF, Marines Join in Tactical Test

Using Army ground terminals and an Air Force satellite, a battalion of Marines stormed ashore the tiny island of Vieques, Mar. 19, to begin the assault landing phase of the U.S. Second Fleet Exercise Rugby Match.

Simultaneously, instant communication via the LES-5 experimental satellite was established between the forward operating elements in the Vieques Island (near Puerto Rico) maneuver area and Continental U.S. military bases in Virginia and North Carolina.

Exercise Rugby Match provided the first deployment of this experimental communication system, consisting of the Air Force satellite and five Army-developed mobile terminals, for evaluation concurrent with maneuvering naval amphibious forces in a tactical situation.

Operated by Army teams, five vehicular-mounted terminals participated in the one-day exercise. Built by the U.S. Army Satellite Communications (SATCOM), Fort Monmouth, N.J., these terminals consist of two jeep-mounted terminals, two ¾-ton truck installations and one 26-foot-van terminal.

During the exercise, command and control communication was provided by the two jeep terminals and one ½-ton terminal on Vieques, the second ¾-ton at Camp Lejeune, N.C., Command headquarters in Norfolk, and the van terminal at Atlantic, Va.

Two previous highly successful test phases of the satellite communications system have been conducted in the Fort Monmouth area and at the U.S. Army Tropic Test Center in the Panama Canal Zone. (See February issue of this magazine, p. 8, for SATCOM Tests Tactical Satellite Communications in Jungle.)

Concurrent testing of the system began in February with operations at Fort Bragg, N.C.; Fort Gordon, Ga.; Fort Benning, Ga.; and the Strike Command at McDill Air Force Base, Fla. culminating in the deployment of the SATCOM terminals in support of Exercise Rugby Match.

CG of the Fleet Marine Force-Atlantic, Lt Gen Richard G. Weede is briefed on Experimental Army Satellite Tactical Terminals (EASTT) capabilities by 1/Lt Lowell J. Smith of the SATCOM Agency. The EASTT provided command and control communications via an Air Force satellite during the U.S. Second Fleet's Exercise Rugby Match.

Automation Speeds Tests of Radio for SE Asia

Manpack radios destined for service in Southeast Asia are being tested 10 times more rapidly with new automated equipment than could be accomplished manually by skilled technicians.

Developed for the U.S. Army Electronics Command, Fort Monmouth, N.J., by the Defense Electronic Products, Aerospace Systems Division, Radio Corp. of America, the new tester is incorporated into the Sacramento (Calif.) Army Depot Installed Automatic Test Equipment (DIMATE).

A similar DIMATE is installed at Tobyhanna Army Depot, Pa., and a third unit is planned for Lexington-Blue Grass Army Depot, Ky.

The Sacramento Army Depot system averaged 8½ minutes per unit for 1,000 radios that have since proved highly successful in Southeast Asia. Average bench time for testing the AN/PRC-25 units is 1½ hours.

DIMATE can be operated by unskilled labor with but 24 hours of special training. The system provides computer-controlled, consistent, high-quality testing of electronic equipment frequency band and many megahertz - the top of the government with frequencies up to 400 times the frequencies of ordinary combat radios.

AN/PRC-25 tests at Sacramento were considerably faster than DIMATE's average on all electronic equipment, but not as fast as some checks. The peak to date is about 20 times as fast as hand testing.

DIMATE testing is standardized as contrasted with manual testing, which is dependent on the skill of the technician. Use of unskilled operators on DIMATE leaves the experts free to do repair or other essential work.

ECOM work on DIMATE was handled by Joseph Chazen, chief of the Automatic Equipment Branch, Maintenance Support Division, Sheldon E. Stern and Richard D. Schepis.

DIMATE is an automatic test set whose operation may be controlled by the computer or the controller portion of the set. Its self-contained stimuli (voltage, frequency, etc.) are programable as is the measurement subsystem. It is capble of automatic, semiautomatic or manual operation.

Testing and fault isolation are performed to the lowest practical level. Faults may be traced to a specific area, subassembly, module or even individual part, depending on accessible connectors and available test points of the equipment being tested .

Either magnetic or mylar paper tapes are used in the test program. Such a program on tape is transferred to the DIMATE computer's high-speed memory. Results are displayed or printed out.

Hawk Missile System Contract

The Army Missile Command has awarded $1,549,500 to Raytheon Co. for radio frequency oscillators used in the Hawk Missile System, a highly mobile member of the Army's air defense arsenal of missiles.

Capable of intercepting high performance aircraft and airbreathing guided missiles at low altitudes, the weapon system is in operation with Army and Marine Corps units in the United States and overseas.

SCIENTIFIC CALENDAR

2d International Conference on Vacuum Ultraviolet Radiation Physics—Interaction with Solids, sponsored by ARO-D and ONR, Gatlinburg, Tenn., May 1-3.

6th Annual Workshop of the Interagency Data Exchange Program, sponsored by OCRD, Air Force, Navy, NASA and the North American Rockwell Corp., Los Angeles, Calif., May 1-3.

Fifth National Colloquium on Information Retrieval, sponsored by IEEE, Moore School of Electrical Engineering, University of Pennsylvania, Special Interest Group on Information Retrieval, American Documentation Institute Association for Computing Machinery and Frankford Arsenal, Philadelphia, Pa., May 3-4.

Meeting of the American Institute of Chemical Engineers, Tampa, Fla., May 5-8.

Error Correcting Codes Symposium, sponsored by MRC, Ann Arbor, Mich., May 6-8.

Meeting of the American Institute of Industrial Engineers, Tampa, Fla., May 9-11.

Universal Aspects of Atmospheric Electricity Conference, sponsored by AFCRL, ONR and NSF, Tokyo, Japan, May 12-18.

Meeting of the American Society of Civil Engineers, Chattanooga, Tenn., May 13-16.

Power Sources Conference, Atlantic City, N.J., May 14-16.

2d International Meeting on Silicon Carbide, sponsored by AFCRL, Penn State University and the Carborundum Co., University Park, Pa., May 14-16.

1968 International Conference on Quantum Electronics, sponsored by OAR, Miami, Fla., May 14-17.

Symposium on Aerodynamic Noise, sponsored by OAR, Toronto, Canada, May 20-21.

Conference on Functional Analysis, sponsored by OAR, Chicago, Ill., May 20-24.

Joint Computers Conference, Washington, D.C., May 21-23.

CDC Systems Analysis Institute Evaluating Army of 1990s Concepts

Evaluation of some 4,000 developmental concepts for the weapons and tactics required by the Army of the future, extending some plans into the time frame of the 1990s, is a function of the Institute of Systems Analysis, Fort Belvoir, Va.

Lt Gen Harry W. O. Kinnard, CG of the U.S. Army Combat Developments Command (USACDC), welcomed the ISA as a new element early in March by presenting the command flag and enblem to Col Charles W. Calvert, commanding officer of the unit.

Collocated at HQ USACDC, the ISA will furnish comprehensive analyses of all aspects of developmental programs being considered to meet long-range land-combat requirements.

General Kinnard said the ISA is designed to provide an urgently needed home-base scientific and technical laboratory for systematic operational and cost-effectiveness evaluations.

In determining the feasibility and desirability of particular developmental programs as proposed, the ISA will consider anticipated cross-effects between operational concepts, present technological capabilities and military field experience.

Actual experiments cannot be arranged to test many of the concepts for the Army of the future. Consequently, mathematical models will provide for a range of values to ascertain the probabilities of operations in view of available manpower resources and materiel performance.

To achieve a realistic blending of viewpoints in consideration of proposed weapons systems and tactics, the ISA will pool the talents of scientists, engineers, mathematicians and operations research experts.

Analyses of systems concepts will be provided to all components of the Combat Developments Command. Separate teams will focus on the areas of reconnaissance, command and control, aircraft types and utilization, armor systems, support systems and Infantry weapons.

The ISA will consist of five directorates: Reconnaissance, Surveillance, and Acquisition Systems; Aircraft Systems; Support Weapons Systems; Infantry Weapons Systems; and Command Control Systems.

Staffed presently with less than 10 professional personnel, the ISA is ultimately expected to have about 200, all carefully selected for the exacting requirements of the ISA mission. Recruitment consequently is expected to entend over a substantial period of time.

Col Calvert is backed for his new assignment by former service as CDC deputy directory of materiel. Col Horace A. Macintire is his deputy.

Assigned to HQ USACDC since November 1963, Col Calvert has served as deputy and acting director of materiel. Previously he served a tour as commander of a MAAG unit in Iran, and from 1958 to 1962 was stationed at HQ U.S. Continental Army Command, Fort Monroe, Va. He has a BS degree from the University of Missouri and has completed the Command and General Staff College.

Col Macintire has a BS degree in military engineering from the U.S. Military Academy at West Point, N.Y., and was an electronics engineer with the U.S. Army Intelligence Field Agency, Office of the Assistant Chief of Staff for Intelligence, in 1961–62.

Prior to his present assignment, he was a student in a system analysis course offered by the Military District of Washington. He was commander of the 5th Battalion, 81st Artillery, U.S. Army Europe, in 1963–64, following duty in the Intelligence Division.

Dr. Boris Kit, ISA staff mathematician, also heads the Reconnaissance, Surveillance and Acquisition Systems Directorate. Born in Russia, he is renowned as a research leader, professor, theorist, author, administrator and linguist (fluent in Russian, French, Polish, Spanish and English).

In 1919 he went to Poland, remaining until the early 1940s and earning the equivalent of a PhD degree in the physical and mathematical sciences at the University of Wilno. Following postgraduate work at the University of Munich, he emigrated to the United States in 1948 and became an American citizen in 1954.

Dr. Boris Kit

Dr. Kit established his international reputation as a scientist with the National Bureau of Standards, the North American Aviation Space Division, the Communications Satellite Development Program at International Telegraph and Telephone Corp., and the Aerospace Technology Division of the Library of Congress.

He is known for extensive publications on lunar and satellite communications, the USSR's space program, gravitation theory, manned lunar intransit rendezvous concepts, and operations research techniques. His work has been recognized at the International Symposiums of Space Technology and Science, and at the International Congress of Astronautics.

INSTITUTE OF SYSTEM ANALYSIS (ISA) inauguration ceremonies included presentation of the USACDC emblem plaque to the first CO of the ISA, Col Charles W. Calvert (left). USACDC Commander Lt Gen Harry W. O. Kinnard made the presentation.

Kielman New Consultant For Lab Sciences in OTSG

Col Edmund R. Kielman, MC, has been assigned as laboratory sciences consultant in The Army Surgeon General's Directorate of Professional Service.

Col James L. Hansen, MC, vacated that post to become deputy director (Army) of the Armed Forces Institute of Pathology (AFIP) in July 1967.

Col Kielman's previous assignment was in Saigon as deputy surgeon and chief of the Professional Service, Office of the Surgeon, HQ U.S. Army, Vietnam.

Except for two years in Reserve status, Col Kielman has been on active military duty since he completed internship in 1943 at the University of Pittsburgh, where he received BS and MD degrees.

Institute of Land Combat Making Progress

One year of solid progress in organizational, recruitment-of-talent and program-development effort by the Institute of Land Combat since it was activated is now being extended into Europe, Africa and Asia.

Established as an element of the U.S. Army Combat Developments Command, the ILC is commanded by Col Norman Farrell and is collocated at USACDC Headquarters, Fort Belvoir, Va. The assigned mission is to create concepts and develop material and strategic systems designed to meet threats posed 20 to 25 years ahead by the world situation.

Maynard N. Shirven of the ILC Environment and Threats Directorate departed in mid-February on a marathon fact-gathering effort. In two months he will visit about 25 cities, introducing a program of reorientation and research tours for specialists of the directorate. One of his visits is with General Lyman L. Lemnitzer, Supreme Allied Commander in Europe.

Since June 1967, he has supervised an expanding group of experts recruited from U.S. Government, academic, nonprofit and commercial research organizations. Each staff member has been carefully selected for unique experience and knowledge about a specific geographical area.

The primary mission of the group supervised by Shirven is to collect reliable information and to project comprehensive alternative images of the kind of world in which the U.S. Army Land Combat System of the 1990s will be functioning.

Col Melvin H. Rosen, chief of the Environments and Threat Directorate, said the only way the Shirven team can come up with "plausible alternative environments of the world in 1990" is to gain fresh knowledge of trends—military, political, economic, technological, sociological—in all geographical areas.

"Since causes breed effects," he explained, "the better tap you have on all the causes, the better equipped you are to minimize the intractable elements in forecasting. Experts soon lose their expertise as they get farther away from first-hand contact with their areas of knowledge."

Shirven is known as an expert on conditions in Asia and has served with the Agency for International Development missions in Pakistan and Vietnam. For several years after World War II, he was on General MacArthur's staff as adviser to the government of Japan. Later he was an economist and international relations officer at HQ Far East Command and United Nations Command.

Realism of the military threats forecasts, it was stated, can best be insured by sending each member of the ILC Environments and Threats Directorate to visit his geographical area at least biennially.

ILC forcasts are projected in the long-range frame of the future. Forecasts in more immediate time-frames are accomplished by other elements of the U.S. Army Combat Developments Command. ILC's job is to determine potentially dangerous trends and define U.S. activities to meet each threat.

To perform this mission, the ILC draws upon the U.S. Army Materiel Command for feasible materiel concepts based on the envisioned technological and scientific capability 20 or more years in the future. The ILC Directorate of Management is under Col Arthur B. White.

Close coordination is maintained continuously with the Office of the Assistant Chief of Staff for Intelligence to develop integrated concepts and development plans.

Each concept is thoroughly tested and evaluated to insure that the best mix of the capabilities of firepower, mobility, manpower resources and service support is achieved as an end product.

ILC forecasting is not triggered by response to a specific occurrence such as, for instance, the emergence of a new capability in the arsenal of the potential enemy.

Instead of preparing topical threat analyses answering, for expediency's sake, a specific issue, the ILC forecasts world environments which lead to defining, in the Conflict Situations and Army Tasks Study, the kind of situations and tasks which the U.S. Army can expect in the 1990s.

ILC studies necessarily are of a comprehensive, kaleidoscopic nature, viewing a projected panorama of the 1990s. Not only do they open up formerly unrecognized opportunities for development progress. They are somewhat exclusive in effect, because they imply what the world probably is *not* going to be like. By defining plausible options, the studies seek to channel developmental effort of the U.S. Army in sensible paths.

ILC's Directorate of Military Technology, headed by Col Walter E. Mather, is concerned with preparation of the compendium, or "shopping list," of plausible materiel development options for 1985–1990.

Based on anticipated Army tasks and the listing of plausible materiel systems which could be available to accomplish the tasks, the ILC Directorate of Conceptual Design prepares alternative designs of concepts for a "viable, integrated land combat system for 1985–1990." Col John P. Brown directs activities.

The next job falls to the ILC Directorate of Evaluation. Headed by Col Thomas B. Ross Jr., it determines the order of preference of the envisioned options and incorporates results into a cohesive Land Combat System Study 1985–1990.

Albertson Succeeds Snyder as CO of RIA

Lt Col James J. Albertson took command of Rock Island (Ill.) Arsenal Mar. 15 when Col Harry A. Snyder, CO since June 1966, was reassigned to HQ, U.S. Army Europe, and Seventh Army, Heidelberg, Germany.

Col Albertson was chief of the Programs Branch, Operating Resources Management Office, Office of the Deputy Chief of Staff (Logistics) until he assumed his new duties.

Graduated from the University of Maryland with a BS degree in general engineering, he turned to business administration and earned a master's degree from Syracuse University. He is a graduate of the Army War College and the Armed Forces Staff College.

The 25-year Army veteran began his career as an enlisted man and served in the European Theater of Operations in 1944 and in Southeast Asia in 1945. When selected for Officer Candidate School in 1947, he had achieved the rank of technical sergeant.

His most recent oversea tour was in Korea (1962–63) with the 7th Division.

ROCK ISLAND ARSENAL commander, Lt Col James J. Albertson, on the list for promotion, is shown with Deputy CO Lt Col C. E. Mitchell as he signs orders upon taking his new command.

DCSPER Teams Aim At Record Suggestion Year

Twenty-five years of the U.S. Army Suggestion Program, a major part of the Army Staff Awards Program, are being highlighted by a large-scale effort to stimulate a record flow of money- and time-saving proposals by the close of Fiscal Year 1968.

Detailed briefings on objectives of the overall program, the various civilian and military incentive awards that are offered, and the procedures to be followed in recommending employes for consideration are being given by teams from the Army Staff Civilian Personnel Division.

Special emphasis is being directed to encouraging substantially increased military participation in the Army Suggestion Awards Program. The Staff Civilian Personnel Division stressed that achievement of the FY 1968 goal will depend largely upon such response.

Army-wide, adopted suggestions in FY 1967 accounted for savings of $40,406,919. A breakout of figures on how much military personnel contributed to this total was not available except at General Staff level. Army staff military personnel offered 97 suggestions, as compared to 483 by civilians. Two of the adopted military suggestions saved $70,000 and two had only intangible benefits.

Under an Army-wide policy change effective Sept. 22, 1965, military personnel became eligible for cash awards on the same basis as civilians.

Supervisors at all levels are being advised of the Army's desire to give deserved recognition for meritorious performance of assigned duties and, particularly, for unusually notable accomplishments.

The briefings also are pointing out numerous educational opportunities offered to Army employes. Included are the Secretary of the Army Research and Study (SARS) Program, the senior service colleges, and fellowships as well as other courses at civilian academic institutions. Each General Staff agency also may nominate three employes annually for Fellowships in Congressional Operations.

Under the Army Suggestion Program, civilian and military personnel may receive awards ranging from $15 to $25,000, depending upon the resulting economies in the cost of Army operations.

Recognition for exemplary performance of duty by civilian employes includes the Outstanding Performance Appraisal, Special Act or Service Award, Quality Step Increase (one of the most desirable of all awards in view of long-term salary gains), and the Sustained Superior Performance Award.

Honorary awards include selection on the Army Roll of Economy Champions, Certificate of Appreciation, Certificate of Achievement, Laurel Leaf Cluster, Meritorious Civilian Service Award, Decoration for Exceptional Civilian Service, Department of Defense Distinguished Civilian Service Award, and the President's Award for Distinguished Federal Civilian Service.

Public Service Awards (for other than Civil Service employes) include the Decoration for Distinguished Civilian Service, Outstanding Civil-Service Award, and Certificate of Appreciation for Patriotic Civilian Service. These awards recognize those who serve the Army as consultants, advisers or under contracts and grants.

Army civilian employes also are eligible for such high honors as the Pace Award, Administrative Management Society Paperwork Management Award, Rockefeller Public Service Award ($10,000 in each of five categories annually), Federal Woman's Award, National Civil Service League Career Service Award, William A. Jump Memorial Award and Arthur S. Flemming Award.

FAAR System to Serve as Early Warning Link

A vehicle-mounted radar that can detect high-speed aircraft at tree top levels and relay target information to nearby antiaircraft sites is being developed under contract with the U.S. Army Missile Command (MICOM).

Called the Forward Area Alerting Radar (FAAR), it will serve as the early warning link of the Army's Chaparral/Vulcan, and Redeye air defense systems in forward battle areas. The Vulcan is a 20mm gun while the Chaparral and Redeye are heat-seeking missiles.

The mobile radar system includes identification equipment that distinguishes between friendly and unfriendly aircraft. A very-high-frequency radio link (L band remotely controlled up to 150 feet) transmits target information to Chaparral/Vulcan batteries and Redeye teams.

When fixed-wing aircraft or helicopters approach battle areas, they are detected and identified by the FAAR. Information on their location is immediately transmitted to air-defense batteries, equipped with shoe-box size displays that indicate the precise sectors of the enemy aircraft.

The FAAR system being developed by Sanders Associates, Inc., under the Chaparral management Office at MICOM, is contained in a transportable shelter, carried to the battle areas on the Army's Gamma Goat vehicle.

Forward Area Alerting Radar

Longhorn Plant Produces Nike Hercules Motors

Nike Hercules missile system sustainer motors are again being produced at the Longhorn Army Ammunition Plant, Marshall, Tex., which manufactured these motors from 1956 until operations halted in 1966.

The first shipment to a tactical Nike Hercules site was made Feb. 23, a full month ahead of the original program schedule for resumption of production. Plant improvements initiated by Thiokol Chemical Corp. engineers under an Army Corps of Engineers contract are paying off in lower production costs, the U.S. Army Missile Command reports.

Production workers in the plant will reach a peak of about 150. About 450 Thiokol employes will be involved in the total operation, including management, engineering, administration, property maintenance and transportation.

Motor cases are being fabricated under a separate $10.6 million contract with Intercontinental Manufacturing Co. at Garland, Tex.

The Nike Hercules high-altitude air defense system, managed by Col Morris W. Pettit at the Missile Command's Redstone (Ala.) Arsenal, has proved effective against high-performance aircraft at a variety of altitudes and has successfully intercepted short-range ballistic missiles in test operations.

ECOM Meet Stresses Aviation-Electronics R&D Priority

Aviation-electronics progress and goals were considered as a high-priority area of Army R&D related to tactical aircraft requirements by about 1,000 representatives of the United States, United Kingdom and Canada at a Mar. 5–7 conference.

The 3-day meeting at HQ U.S. Army Electronics Command, Fort Monmouth, N.J., focused on the theme of "Fresh Winds—New Approaches." Published proceedings will present several volumes of new information on aviation-electronics. Much of the discussed centered on Army helicopter requirements.

The technical symposium was part of an advanced planning briefing for industry. About 60 technical papers were presented by researchers connected with the government, universities and professional societies.

Joint sponsors were the Electronics Command (ECOM), Fort Monmouth chapters of the Army Aviation Association of America, Armed Forces Communications and Electronics Association (AFCEA), and the Princeton-Pennsylvania [universities] Army Avionics Research (PPAAR) program for ECOM.

Lt Gen Harry W. O. Kinnard, CG, Army Combat Developments Command, Fort Belvoir, Va., gave the keynote address, following a welcoming address by Maj Gen W. B. Latta, ECOM CG.

General Kinnard was introduced by General Hamilton H. Howze (USA, Ret.) national president, Army Aviation Association of America (AAAA) and president for product planning of Textron's Bell Helicopter Co. He is known for the far-reaching Howze Board report on Army aviation requirements.

AFCEA National President John T. Planje, vice president of Philips Co. of North American Aviation Co., was among participating dignitaries.

Guest speakers included Dr. Eugene G. Fubini, former Deputy Director of Defense Research and Engineering, Department of Defense, and now a vice president of International Business Machines; Walter A. Hamilton, Deputy Assistant Secretary for Domestic Business Policy, U.S. Department of Commerce; and Joseph D. Blatt, Associate Director for Development, Federal Aviation Administration.

Teams for the industrial briefing were composed of guest speakers and nearly 30 technical employes from ECOM's eight R&D elements. They covered such direct and supporting areas of aviation-electronics as avionics, combat surveillance, electronic warfare, night vision, command communications, meteorology and the supporting sciences for aviation system development.

Director of Army Aviation Col Edwin L. Powell Jr., Office of the Assistant Chief of Staff for Force Development, and Col Francis J. Kelly, commanding officer, Special Warfare Agency, Army Combat Developments Command, made key presentations.

Col James L. Burke was project officer for the conference. A Vietnam war veteran and senior Army pilot, he serves as General Latta's special assistant for aviation and aviation-electronics; he also heads the Monmouth chapter of the AAAA. Col Jack G. Condon, director of the ECOM Production and Procurement Directorate, heads the Monmouth AFCEA chapter.

Maj Gen James Dreyfus (USA, Ret.) worked with Col Burke as General Latta's adviser in planning the meeting. ECOM's deputy project officers were A. S. Hubschman and John F. X. Mannix.

AVLABS Brief Army Aviation Advisory Unit

Army Aviation Scientific Advisory Group (ASAG) members appointed to serve Maj Gen John Norton, CG of the Army Aviation Materiel Command, convened Mar. 5–6 at the Aviation Materiel Laboratories, Fort Eustis, Va.

Col Harry L. Bush, AVLABS commander, welcomed the group and joined with scientists and engineers in the laboratories to brief the visitors on the command mission, facilities and ongoing programs.

Reports were presented by four outside scientists. Paul F. Yaggy, technical director, U.S. Army Aeronautical Research Laboratory, Ames Research Center, Moffett Field, Calif., discussed wind tunnel aircraft studies and advances in techniques.

Dr. Sudhir Kumar, associate director of the Engineering Sciences Division, U.S. Army Research Office-Durham, N.C., spoke on "Aeronautical Basic Research Program." Col Garth Stevens, commander, U.S. Foreign Science and Technology Center, reported on "Foreign Technology." The subject of "Material Technology" was discussed by Carl Steinhagen, manager, Composite Materials Operations, Hamilton Standard Division, United Aircraft Corp.

AVLABS personnel who made presentations included: Larry M. Hewin, technical director, "Introduction to Aviation R&D Programs"; LeRoy H. Ludi, Applied Aeronautics Division (AAD), "Rotary Wing R&D Program"; George T. Singley Jr., chief, AAD, "V/STOL R&D Program"; John W. White, chief, Propulsion Division, "Propulsion Technology"; and

Francis P. McCourt, chief, Safety and Survivability Division, "Aircraft Safety and Survivability"; Richard L. Scharpf, AAD, "Materials and Structures"; Paul J. Carpenter, director, Systems, "Support of Systems Development"; J. Nelson Daniel, chief, Aircraft Systems and Equipment Division (ASED), "Aircraft Support Systems"; J. Everette Forehand, ASED, "Special Purpose Vehicles Flexible Wing Program"; and William E. Sickles, Aeromechanics Division, "Special Purpose Vehicles (GEM)."

Aviation Scientific Advisory Group chairman, Prof. Rene H. Miller, is flanked by Maj Gen John Norton (right), Army Aviation Materiel Command CG, and Col Harry L. Bush, CO, Army Aviation Materiel Laboratories.

Army Expanding M–16 Production By Selecting Two More Sources

The Department of the Army is in the process of selecting two additional sources to produce the M–16 rifle to meet the increasing needs of Free World Military Assistance Forces in Southeast Asia and U.S. logistics and administrative troops.

Negotiations are under way with all bidders who had previously submitted acceptable technical proposals for M–16 production. The two sources selected will be requested to reach necessary production rates as soon as possible.

Selection will be made primarily on the basis of production capability, together with a high level of confidence in the producer's ability to meet an accelerated schedule and maintain quality.

The Department of the Army has requested the present producers, Colt's Industries, to expand production from 30,000 to 50,000 rifles per month.

EXCEPTIONAL CIVILIAN SERVICE. *Leonard W. Hoelscher* received his third Decoration for Exceptional Civilian Service from Army Chief of Staff General Harold K. Johnson upon his recent retirement, ending 27 years of government service.

As Deputy Comptroller of the Army for the past 15 years, Hoelscher served under nine comptrollers. His primary function was to conceive systems for program and financial management within the Army and to direct comptroller activities.

DISTINGUISHED SERVICE MEDAL. *Maj Gen Julian J. Ewell* received the Distinguished Service Medal for exceptional performance as deputy commanding general and chief of staff, U.S. Army Combat Developments Command (CDC), Fort Belvoir, Va., when he departed to command the 9th Infantry Division in Vietnam.

He was praised for his significant role in defining the Optimum Mix of Artillery Units for the Army 1971–75, CDC's Concept Studies for Army 75 and 85, and the Phase II Study of the Army Tank/Assault Weapons Requirements System.

JOINT SERVICE COMMENDATION MEDAL. *Lt Cols Boyde W. Allen Jr.* and *Wallace H. Hubbard*, both assigned to the Office of the Chief of Research and Development, Department of the Army, received this award at recent ceremonies.

Lt Col Allen, chief of the Space Branch, Nike-X and Space Division, was cited for his service as unconventional warfare officer, Operations Division, HQ United Nations Command/United States Forces, Korea, August 1966 to July 1967.

Lt Col Hubbard was honored for his service as executive officer, Army Section, Joint United States Military Aid Group, Greece, February 1965 to July 1967. He is now with OCRD's Combat Materiel Division.

LEGION OF MERIT (LOM). *Brig Gen James S. Pegg*, Director of Dental Activities at Walter Reed Army Medical Center, received the first Oak Leaf Cluster (OLC) to the LOM for his service as Deputy Assistant for Dental Service in the Office of The Surgeon General, July 1963 to October 1967.

The citation commended him for revising the dental section of the Staffing Guide for the U.S. Army Garrisons and establishing a Dental Administration and Management Office at each installation.

Col Leslie G. Callahan Jr., Harry Diamond Laboratories' commanding officer, was awarded the LOM in recognition of his performance as Director of the Avionics Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J., 1965 to 1967.

The second highest noncombat award was presented also to *Col Robert O. Quackenbush*, MSC, at his retirement ceremony. He was cited for distinguished performance in several assignments, ending as chief of the Training Division, Directorate of Personnel and Training, Office of the Surgeon General.

Lt Col Fergus T. Monahan, MSC, received the LOM at his retirement ceremony, recognizing his service as Social Service consultant to The Surgeon General from July 1965 to December 1967. His citation noted that due to his efforts, the Army Social Work Program reached the highest level of excellence in its history. He also developed the health and welfare program for the Job Corps.

Maj Ralph V. Gonzales Jr., assigned to the U.S. Army Aviation Human Research Unit, Fort Rucker, Ala., as a research coordinator, received the LOM for his service from December 1966 to November 1967 as operations officer, 120th Aviation Company (Airmobile) (Light), 1st Aviation Brigade, in Vietnam.

Maj Ralph E. Johnson was presented the LOM upon retirement for his service with the Organization Directorate, U.S. Army Combat Developments Command, December 1966 to Febraury 1968.

BRONZE STAR MEDAL. Lt Col Mary O. Barker, chief nurse of Ward 4, Walter Reed General Hospital (WRGH), was awarded the BSM for outstanding service as chief nurse at the 71st Evacuation Hospital in Vietnam.

Maj Elizabeth M. Lyke, an operating room nurse at WRGH, received the BSM for service with the 12th Evacuation Hospital in Vietnam. *Sp/5 Robert E. Russell*, a medical specialist, received the BSM with "V"

2 WRGH Anesthesiologists Win Metcalf Award

Studies of seriously wounded patients returned from Vietnam, by comparison with a control group scheduled for elective surgery at Walter Reed General Hospital, have earned two anesthesiology residents the third Raymond Franklin Metcalf Award.

Working as a team, Capt Henry M. Escue and Capt John B. Houston investigated acute changes following routine injection of a muscle relaxant shortly after general anesthesia. Their technical report is titled "Serum Potassium Changes Following Succinylcholine."

The Metcalf Award was established by Mrs. Marjorie Metcalf Nichol in memory of her father, chief of Walter Reed General Hospital's surgical service from 1935 to 1939 and commanding general of Walter Reed Army Medical Center for the next two years.

The $150 award recognizes some aspect of surgery considered worthy of special recognition. All WRGH Regular Army resident officers are eligible, but the project must be initiated during residency and the major portion completed during the training. The award was initiated seven years ago.

Capts Escue and Houston noted that the mean increase in blood potassium following intravenous succinylcholine was 12 percent for the control group of 16 patients (normal patients in the hospital for elective surgery) and 87 percent for those with massive trauma from wounds to their extremities without interior injury. Two of the latter patients suffered circulatory collapse, were resuscitated, and underwent surgery without further incident.

The prize-winning research report also received the first award in the resident's competition at the New York State Society of Anesthesiology's Twenty-First Postgraduate Assembly in December 1967.

METCALF AWARD WINNERS, Capt Henry M. Escue (center) and Capt John B. Houston receive certificates and congratulations from Maj Gen Philip W. Mallory, commanding general, Walter Reed Medical Center.

device for heroism during a combat air assault mission with the 1st Cavalry Division in Vietnam.

Capt David E. Cundiff, executive officer of the Field Epidemiological Survey Team, Walter Reed Army Institute of Research (WRAIR) and *SFC David S. Hughes*, a member of the team, received the BSM for service with the 5th Special Forces Group in Vietnam.

The BSM was presented to *1st Lt Erick J. Camp*, an operations officer at the U.S. Army Strategic Communications Command-CONUS, for distinguishing himself while serving in Vietnam with the 362d Signal Co.

AIR MEDAL. *Lt Col Merle F. Ormond*, chief of the Policy Branch, Management and Evaluation Division, OCRD, was awarded the Air Medal with "V" device for heroism while participating in an 8-hour helicopter search amid intensive ground fire to locate a downed aircraft.

ARMY COMMENDATION MEDAL. *Lt Col Rodney M. French*, branch Chief in U.S. Program Manager's Office, U.S./Federal Republic of Germany Joint Tank Development Program, received the 1st OLC to the ACM for his "exceptional technical and scientific skill and outstanding managerial ability in contributing to the first international tank development program."

Lt Col Lavern R. Riesterer, R&D coordinator and assistant to the technical director for military applications, U.S. Army Aviation Materiel Laboratories (AVLABS), Fort Eustis, Va., also received the 1st OLC to the ACM. He was cited for his work as a program research director from May 1964 to January 1968.

His citation noted that he directed and coordinated the efforts of industry and the military in successfully concluding the major flight test programs for the XV–5A and the CL–84 experimental aircraft. He was also awarded the AVLABS plaque for meritorious service.

Maj Robert E. Kleber, MSC, now assigned to the Directorate of Personnel and Training in The Surgeon General's Office, was awarded the ACM for his service with the U.S. Army in Alaska.

Maj Donald R. Morelli received the 2d OLC to the ACM for his service as a Combat Developments staff Officer in the Joint Operations Division of the Directorate of Doctrine, CDC, prior to departure for duty in Vietnam.

S/Sgt Donald L. Bennett of the Night Vision Project Manager's Office, Fort Belvoir, Va., was awarded the ACM for service on a special mission for the project manager. *Sgt Andy A. Ray*, now with the U.S. Army Airborne, Electronics and Special Warfare Board, Fort Bragg, N.C., received the ACM for his service in Vietnam with the 53d Signal Battalion, Company A, June 1966 to December 1967.

Sp/5 Donald W. Allen was presented the ACM for meritorious performance of duty from November 1965 to February 1968 as supply and transportation specialist, Office of the Adjutant, U.S. Army Research Office, OCRD.

JOHN H. WHITING GOLD MEDAL. *Samuel Lipson*, a metallurgist at the Pitman-Dunn Research Laboratory, Frankford Arsenal, Philadelphia, Pa., received the John H. Whiting Gold Medal of the American Foundrymen's Society for "scientific and technological contributions affecting the qualities of high strength, reliability and design as they apply to aluminum castings,"

MISCELLANEOUS AWARDS. *Maj Gen Walter E. Lotz Jr.*, commanding general, Strategic Communications Command, Fort Huachuca, Ariz., was recently elected a Fellow in the Institute of Electrical and Electronic Engineers. He was cited for his contributions to research in military communications and planning for worldwide implementation.

George W. Knighton, chief of the Operations Branch, Engineering Department, Nuclear Power Field Office, Fort Belvoir, Va., received a certificate and cash award for coauthoring a paper titled "Radiation Effects on Pressure Vessel Steels and Operations to Minimize the Influence of These Effects."

CERTIFICATES were awarded to nine civilians in the Army Research Office, OCRD. *Mrs. Sally C. Kennedy*, Research Plans Office, was cited for Special Achievement. Awards for Outstanding Performance recognized *Dr. Delaney A. Dobbins*, Behavioral Sciences Division; *James W. Sterling* Research Plans Office; *Mrs. Thelma F. Heisler* and *Mrs. Marcia A. Opiela*, Scientific and Technical Information Division; *Mrs. Cecelia M. McParland*, Environmental Sciences Division; *Mrs. Janice B. Sexton*, Office of the Assistant Director of Army Research; *Mrs. Cora F. Watson*, Office of the Deputy and Scientific Director; and *Rufus M. Mitchell*, Office of the Adjutant.

Other recent OCRD recipients of Outstanding Performance Awards are *Robert J. Facey* and *Alfred F. Birra*, International Office; *Mrs. Madeleine W. Stelpflug*, Combat Materiel Division; *Miss Elizabeth A. Szepanski*, Special Warfare Division; *Mrs. Ellen J. Curry*, Office of the Director of Developments; *Raymond B. Murray Jr.*, Programs and Budget Division.

Paul V. Dobrow, Management and Evaluation Division, received a Certificate of Commendation for work as representative of Department of the Army monitor for the Eliminating Gold Plating (Value Engineering) Area of the Cost Reduction Program.

ARMY COMMENDATION and a cash award for research on prevention of postcrash fires in aircraft accidents, reportedly the first award of its kind made to an Army Materiel Command officer, was presented recently by Maj Gen John Norton, CG, Army Aviation Materiel Command, to Capt (Dr.) George W. Bowling. Army Aviation Materiel Laboratories (AVLABS) Commander Col Harry L. Bush observes. Capt Bowling, 28, holds a BS degree from Carnegie Institute of Technology, a master's in chemical engineering (1963) and PhD (1967) from the University of Michigan. He was cited by the Department of the Army for outstanding performance of duties as project engineer for the emulsified fuels research program at AVLABS, Fort Eustis, Va. Research commendations and cash awards have in the past been made only to civilian scientists and engineers of AMC units, Fort Eustis officials said.

Communicators for Our Army in Vietnam

By Brig Gen Thomas M. Rienzi

Stepped-up demand for modern communications systems for the conflict in Southeast Asia, coincident with rapid advances in this age of electronic miracles, has required the U.S. Army Signal School at Fort Monmouth, N.J., to operate on a rigorous around-the-clock wartime basis since 1966.

Nearly 18,000 students signed in during the past year. About 2,000 were officers who came for professional training and higher education through the 12 courses offered by the Department of Command Communications.

Approximately 16,000 were enlisted men who came to participate in the Department of Specialist Training's 60-course curriculum in military electronics. The DST is the Signal School's largest academic element.

DST students come to learn how to repair, maintain and operate the communications gear, photo and automatic data processing equipment and radar used by the Army Signal Corps in Vietnam and around the globe. Courses are in the DST's five departments—audio visual, communications security, data communications, radar and radio.

Seeing the assemblage of complex electronic equipments in classroom and laboratory, the average visitor to the school asks, "How can any man, coming in as a student, usually without previous experience in electronics, learn not only to operate but to tear down and rebuild this space-age gear?"

The answer, of course, is that learning by the educational methods used here, as in all of the U.S. Continental Army Command's service schools, he can! Proof is in the large graduation rosters.

As in all Army service schools, emphasis in teaching here is on doing—learning "with hands on equipment." Classrooms and labs are equipped with the same highly sophisticated electronic gear which students, later as soldiers, will have to operate, repair and maintain in the field for the Signal Corps.

Three multimillion dollar training facilities—each duplicating the most modern military "communication miracles" developed in cooperation with industry for the field—were added to the large school complex during the buildup period since 1966.

IWCS AND AUTODIN. A new Integrated Wideband Communications System (known as IWCS) similar to the ones which now carry the bulk of communications in South Vietnam and Thailand, was opened as a training facility late in 1967.

The IWCS center encompasses training classrooms, duplications of two complete field terminals, three field technical control centers, a multiplex technical control room, a voice-frequency multiplex facility, a telegraph multiplex center, and two complete receiving and transmitting complexes.

In addition, a communications traffic stimulator enables instructors to introduce communications problems into the system for training in trouble shooting.

Hard upon the heels of the installation of IWCS came the acquisition of another highly sophisticated training center for the Department of Defense's Automatic Digital Information Network (AUTODIN). This computer-controlled worldwide military communications system is being implemented overseas under prime contract between Philco-Ford's Communications and Electronics Division with the U.S. Army Electronics Command.

While overall management of these systems is the responsibility of the Defense Communications Agency, the Signal School has been given the mission of training operations and maintenance personnel for DoD services.

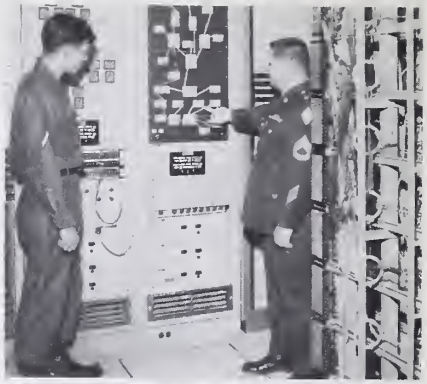
SATCOM GROUND LINK TERMINAL. Earlier, the Signal School acquired a complete satellite communications ground link terminal, with a 58-foot-high white radome. History was made when it started to teach the first complete Army course, open to personnel of the Military Services, in installation, operation and maintenance of earth-bound satellite communications equipment.

Readers may become concerned about expense involved should a student "goof" in handling such high-priced gear. Therefore, it should be noted that the Signal School makes wide use of mock-ups and simulators as teaching devices in initial stages of training for trouble-shooting. Most of these are tailor-made by the training aids division.

Many other methods and devices have been developed within the Army service school system to aid the student in mastering specialties in this complex field of electronics in a relatively short time. As an example, the Signal School has pioneered in, and uses, "programed instruction" employing teaching machines and the book form.

This "self-paced" technique enables students to remedy deficiencies in their backgrounds before proceeding with more difficult lessons. Within practicable limits, it enables quicker students to advance more rapidly.

Closed circuit TV is used with great effect. Eighteen miles of underground cables pipe television into 500 sets. Instructors, using the school's



GEOGRAPHIC DISPLAY BOARD of the military Integrated Wideband Communications System (IWCS), used in Southeast Asia, lets operators at each site know where system trouble exists and just what went wrong. An instructor shows a student how indicator works at the U.S. Army Signal School's new IWCS replica training facility at Fort Monmouth, N.J.

Brig Gen Thomas Matthew Rienzi has been commanding general of the U.S. Army Signal Center and School, Fort Monmouth, N.J., since April 1966. A 1942 graduate of the U.S. Military Academy, he holds an MS degree in electrical engineering from the University of Illinois (1948) and an MA degree in international affairs from George Washington University (1966).

General Rienzi graduated from the Army War College in 1958 and from the Command and General Staff College in 1945. Before his assignment to Fort Monmouth, he was chief of the Combat Surveillance Office, HQ Army Materiel Command. Other assignments include executive officer to the Army Chief of Communications-Electronics, and signal officer for the 18th Airborne Corps, Fort Bragg, N.C.

answer to TV guide, can tune in channels that feed training films, videotapes and live instruction around the clock to classroom sets as an aid to learning.

No part of the Signal School mission exceeds in urgency that of training—here and now— the Army communicators needed to support the American effort in Southeast Asia. Secondary to its importance is the continued search for new and more effective ways to teach the mass of students.

Ranking high in this area are two concurrent major projects which have engendered national interest in the field of education. Both are being conducted by the Signal School under direction of the United States Continental Army Command, which has supervision of Army service schools.

COMPUTER-ASSISTED INSTRUCTION. One of these projects seeks to develop the use of Computer-Assisted Instruction, known as CAI, for the Signal School's vast electronics training. Still considered in user-development stage, the effort in this field is the first undertaken within an Army service school.

Known in military circles as COBET (Communications Basic Electronics Training), the second project is concerned with developing a self-pacing, practical basic electronics course. The concept is that it could be used for all Army students, regardless of the service school they will eventually attend.

EDUCATION ENGINEERING. Along with other USCONARC schools, the Signal School is concerned with development of what is known as "educational systems engineering." This refers to the methodical planning of the structure of each course in an educational institution.

Basic to a system is analysis of the exact skills and degree of knowledge required for each task the student will perform in his military position. By developing a data bank of objectives, educators set up the optimum teaching sequence. They decide upon the most effective media to be used in teaching each segment within the data bank, and they formulate a detailed course evaluation plan.

Electronics communications is "big business" and specialists are in great demand by industry. Efforts of the Army Signal School—and the taxpayer dollars that go into this training mission so vital to our national defense—will eventually redound to the civilian economy.

Signal School training means more than a Military Occupational Specialty to these students. For most students what they learn may lead to careers in civilian industry. Many electronics firms have a seemingly insatiable need for ex-soldiers well trained in this ever-advancing field.

ARMY INSTRUCTOR assists Air Force student in mastering one of the consoles at the Automatic Digital Information Network (AUTODIN) Training Center, Fort Monmouth, N.J. This computer-controlled military communications system is a duplicate of the system being established overseas.

First WAC Officer Attends AWC

Lt Col Frances V. Chaffin will begin classes in August as the first WAC officer to attend the Army War College at Carlisle Barracks, Pa. Army Chief of Staff General Harold K. Johnson approved attendance of women officers at the senior service school in November, 1967.

Hardison Wins Army's Top Civilian Award

Significant contributions to feasibility, cost and effectiveness studies of major weapons systems gained the Army's highest honorary recognition for David C. Hardison when he recently was presented the Exceptional Civilian Service Award.

Hardison has served since May 1964 as the first scientific adviser to the U.S. Army Combat Developments Command at Fort Belvoir, Va. In addition to his primary duties of providing scientific guidance to Lt Gen Harry W. O. Kinnard, CG, he has distinguished himself in a rapid succession of high-level studies of R&D problems.

With other top-rated Army scientists, officially known as "The Committee of Four," Hardison in 1966 helped to shape a minutely detailed plan for organizational changes and management methods with respect to the R&D and logistics process. The committee's effort included a lengthy analysis of problems, pertinent findings and recommendations.

Serving with him were Dr. Wilbur B. Payne, chief of Operations Research, Office of the Under Secretary of the Army; Dr. K. C. Emerson, Assistant for Research to the Assistant Secretary of the Army (R&D); and Dr. Ralph G. H. Siu, Deputy Director of Developments, Army Materiel Command.

Hardison was cited for his contributions to REDLEG Mix, a study of Artillery weapons requirements; TATAWS (Tank, Antitank and Assault Weapons Studies); UTTAS (Utility Tactical Transport Aircraft System); Phase II of AAFSS (Advanced Aerial Fire Support System); HAW (Heavy Antitank Weapons); TOW (Tube-launched, Optically-tracked, Wire-guided) antitank missile; and the Shillelagh missile system.

SCIENTIFIC ADVISER to the USA-CDC, David C. Hardison, receives Exceptional Civilian Service Award from Lt Gen Harry W. O. Kinnard, CG of Army Combat Developments Command.

He has authored articles on the cost effectiveness of the Main Battle Tank (MBT–70s), a joint United States-Federal Republic of Germany development project, and other weapons systems. Recognition came to him also for his advisory assistance in the Cuban missile crisis.

Graduated from Atlantic Christian College with a degree in mathematics in 1949, Hardison earned a master's degree from Duke University in 1952 and then became an employe of the U.S. Army Ballistic Research Laboratories, Aberdeen (Md.) Proving Ground, until 1964. He was deputy chief of the Weapons Systems Laboratory when he transferred to USA-CDC. He served in the Navy during World War II.

Army Research Office Marks 10th Year

(*Continued from page 9*)

Generally called "ptomaine poisoning" by laymen, this relatively rare botulism is often fatal, while the more common staphylococcal food poisoning is very often incapacitating and may be fatal.

Purification of these two toxins was accomplished as a part of the Army research program, with the collaboration of the Food Research Institute of the University of Chicago. Discoveries have opened the way for a more exact diagnosis and will point to identification of the mechanism of action of the extremely potent and virulent poisons in foods.

ARIEM Establishment. The U.S. Army Research Institute of Environmental Medicine (ARIEM) was established Sept. 20, 1961, as a Class II installation of the Medical R&D Command. Located at the U.S. Army Natick (Mass.) Laboratories complex, ARIEM conducts research on problems of the environment as they affect the ability of combat soldiers to perform duties under variable factors.

MUST Program. Deployment of the first MUST (Medical Unit Self-contained, Transportable) to Vietnam in September 1966 has been hailed as an epochal advance in capability to provide modern medical service to the field armies in remote areas. Developed as a "building block" system, it integrates shelters, utilities and functional equipment in a compact, lightweight package transportable by truck or aircraft.

MUST units can be tailored to the needs of the force to be supported and to provide a high level of medical care under any environmental condition. The facilities provide a controlled, contamination-free environment which is increasing casualty survival. MUST supplies the medical care components of evacuation and mobile surgical hospitals, division and nondivision clearing stations, dispensaries and dental units to field armies.

Looking to the Future. The Life Sciences Division is projecting plans for special effort in high terrestrial altitude research, presently centered largely at the U.S. Army Medical Research and Nutrition Laboratory, Fitzsimons General Hospital, Denver, Colo., and the U.S. Army Institute of Environmental Medicine.

The need for this type of research is accented by the possibility of combat in high altitude areas. Combat effectiveness of the individual soldier is seriously reduced during military operations at altitudes greater than 10,000 feet.

Another area of continued intensive effort will be the further improvement of spray adhesives for surgery. Plastic spray adhesives developed by the Surgical Research Team at WRAIR have proved successful in experimental use to stop hemorrhage in human tissues when surgical sutures fail. Used only in emergencies in Vietnam, under carefully restricted and controlled conditions, the spray tissue adhesive has been credited with saving a number of lives.

Continued emphasis also will be devoted to the Ambush Detector Dog Program, currently being conducted by the University of Maryland under contract with WRAIR. This research is a part of the Medical R&D Command program and specific research eventually will be conducted at Edgewood Arsenal, Md.

OFFICE OF NAVAL RESEARCH tribute to U.S. Army Research Office on the occasion of its Tenth Anniversary, March 24, 1968, presented by Rear Adm T. B. Owen, U.S. Navy, Chief of Naval Research.

Use of dogs has been determined the most reliable to date in the overall Army Improved Biological Sensor Program. No weapon system has been devised, Army researchers report, that can replace a *good dog* for the specific unusual missions they can perform in ambush, mine, booby-trap and tunnel detection required in Southeast Asia.

ENVIRONMENTAL SCIENCES. Dr. Leonard S. Wilson, chief of the Environmental Sciences Division, contends that its origin stems to the 1946 appointment of Dr. Paul A. Siple to the staff of the Office of the Chief of Research and Development, G4, War Department. Dr. Siple was recognized at that early stage of his illustrious career as one of the world's great explorers.

When the Environmental Research Branch was established in the Research Division of OCRD, Feb. 2, 1955, Dr. Wilson was designated as chief. In 1959, the present ES Division was established as a consolidation of the Geophysical Sciences Branch and Polar Research Division.

The division, in addition to exercising staff supervision over a program worldwide in scope, serves as the Department of the Army intermediary with the scientific community generally as well as within the Department of Defense. Its mission is to insure that the best and latest knowledge in the environmental sciences is applied to solutions of Army problems and meeting operational requirements.

Responsibilities of the ES Division include research and exploratory development in astronomy, astrophysics, aeronomy, meteorology, geography, oceanography, earth physics, cartography, geomorphology and geodesy.

Organized into the Geophysics Sciences Branch, headed by Dr. Hoyt Lemons, and the Regional and Special Projects Branch (Dr. Fernand P. de Percin, chief), the ES Division provides General Staff coordination for RDT&E activities in extreme environments of the tropics, desert, arctic and remote underdeveloped areas.

Looking back over the past decade, ES Division leaders have selected some significant results of the program they supervise as follows:

Cooperation in NATO Studies. The Army Research Office provided an ES Division scientist as the U.S. Team Leader for the NATO Long-Term Scientific Study on Land-Based Mobility, an updating of the original von Karman study. The Team Leader assisted a UK representative serving as Executive Agent in preparing a draft working paper of the study.

The Army Research Office coordinated technical input data from other Army agencies, the Navy and Air Force to feed to the Team Leader. When the multination study meeting was held in May 1967, in Naples, Italy, USARO representatives coordinated and supervised participation of U.S. team members. USARO also provided the terrestrial and oceanographic representative for the U.S. group which prepared the original long-range von Karman study.

USARO representatives were prominent in organizing the Tripartite (later Quadripartite) Working Group on Ground Mobility under the aegis of the Quadripartite Research Coordination Committee, and provided the group's permanent secretary. This group established the first glossary of terms used in mobility research in the countries concerned.

The group also provided a basis

for international cooperation and collaboration in research—by identifying Canadian leadership in muskeg research, United Kingdom leadership in terrain evaluation through landscape facets, and United States leadership in terrain evaluation by environmental factor effects.

Dust Control at Vietnam Airfields. In response to an urgent requirement from U.S. forces in South Vietnam for dust control measures at airfields, the ES Division coordinated with the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., for corrective action.

WES quickly consolidated results of research for dust control to provide a membrane and application technique for helicopter airfields. Within one month, the first purchase of Peneprime was on its way to Vietnam and by July 1966, some 18,000 long tons of the material were ready for use.

Prior to the time when the need for expedient airfield surfacings in South Vietnam was recognized, the U.S. Army had conducted experiments with landing mats lighter and stronger than those then available through regular supply channels.

Consequently, it was possible in 1965 for the Office of the Secretary of Defense to proceed with expedited procurement of unprecedented amounts of completely new surfacings which were delivered quickly to Vietnam. Because Army research kept pace with the state-of-the-art, it was possible to supply the mats without further R&D actions.

Soil Stabilization in Vietnam. Results of U.S. Army research in soil stabilization were applied in village pacification programs in Vietnam in 1966. A WES representative went to Vietnam to instruct indigenous personnel in soil stabilization techniques, and to aid them in improvement projects by making maximum use of available materials.

Distribution of Arthropods. Through the Earth Sciences Laboratory, U.S. Army Natick Laboratories, USARO sponsored a program to compile and organize information on distribution and occurrence of insects and other arthropods of medical importance. Cornell University has conducted this research under an Army contract.

Information on occurrence and biology of arthropods of medical importance has been updated in the scientific literature. A series of reports, each on a continental basis, is being published. Distributions of the most important species of arthropods have been mapped by continents. Maps will be published, with a brief explanatory test, as an "Atlas of Medically Important Arthropods."

Southeast Asia Studies. The Natick Laboratories initiated environmental studies of Southeast Asia in 1960 and the following reports have been published, with others to come:

"Notes on Some Environmental Conditions Affecting Military Logistics in Thailand"; "Analysis of Geographic and Climatic Factors in Coastal Southeast Asia"; "The Rainfall in Thailand"; "Temperature Change with Elevation in Burma"; "An Environmental Comparison of Panama and the Island of Hawaii"; "Climatic Atlas of Southeast Asia"; and "Clothing Almanac for Southeast Asia."

Current research includes thematic mapping of militarily significant data for Southeast Asia, a climatic analog study of Southeast Asia, studies of the food geography and harmful insects in Southeast Asia, a study of land forms in Thailand, and collection and analysis of environmental data at representative tropical locations in Thailand.

Mountain Environment Studies. Militarily important characteristics of mountains and highland regions have been under study for many years by the Natick Laboratories and the Cold Regions Research and Engineering Laboratories (CRREL), Hanover, N.H.

Field studies have been made at Mount Washington, N.H., the Brooks Range in Alaska, the White Mountains of California and Nevada, the St. Elias Mountains, Rocky Mountains, the Sierra Nevadas, and the Colorado Front Range.

Atlases have been prepared to depict distribution of mountain glaciers in both the Northern and Southern Hemispheres, and reports have been published on other aspects of mountain environments.

Work has been conducted and is continuing on a contract basis in the Wrangell-St. Elias Mountains on

(*Continued on page 46*)

Northwestern Sees Need to Revamp S&TI

Army scientific and technical information system designers who have pondered about how to induce more use of readily available reports can turn to a disclosure of results of a new survey emphasizing the problem.

Northwestern University researchers reported at the 1968 meeting of the Institute of Electrical and Electronics Engineers, Mar. 18 in New York City. Their findings indicated a need for "new and vigorous programs of training and organizational change" in information and data systems.

Conclusions were based on a study, financed by a U.S. Public Health Service grant, of the use of free phone-in facsimile and photocopying service from a leading medical library in Chicago directly to staff doctors in their hospitals.

The researchers, Gustave J. Rath and William C. Moor, connected the Crerar Library by direct-wire facsimile machines to six Chicago-area hospitals. A cancer research group and a heart specialists group in each of the hospitals took turns using the service for three months each.

Results? Only 40 out of 106 specialists chosen for the experiment used the service during their three months; about 30 made over one request.

Rath is a professor of industrial engineering and management sciences at Northwestern's Technological Institute. Moor is a Northwestern PhD degree candidate. They identified the 10 heaviest users as already being active and persistent information seekers in their specialities before the experiment.

Nonusers were identified as "less accustomed to and less tolerant of delays in obtaining library information and less interested in attending professional meetings."

Of 141 "Infosearch" information requests during the experiment there were 80 requests for copies of specific journal articles; 50 for copies of medical bibliographies; 6 for specific information; 105 were for photocopy service; and 3 gave no preference.

None of the 141 requests was for facsimile service only. Only 10 requests could not be filled because of imperfect citation of the source or nonexistence in the Crerar collections.

Each of the 106 researchers involved in the experiment was fully informed by Rath, Moore and another Northwestern graduate student, David J.. Werner, during advance interviews. Regular checks also were made with the subjects to maintain current records. Intensive follow-up interviews are being conducted to learn if the experiment influenced information-seeking behavior.

The U.S. Public Health Service support of the experiment was a part of the Program of Research on the Management of Research and Development at Northwestern University under the direction of Albert H. Rubinstein, professor of industrial engineering and management sciences.

The "research on research" project involves the study of formal and informal information-seeking and disseminating behavior of researchers.

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the Alaskan/Yukon border, wherein the environment of areas analogous to the Himalayan Mountains are being studied. Areas of elevations up to 17,300 feet are involved.

Atmospheric Sciences Laboratory. The Army R&D Committee for Meteorology was created at about the same time as the Army Research Office was established in 1958. Its function has been to coordinate widely scattered efforts and to understand the needs of Army agencies for meteorological support.

The Atmospheric Science Laboratory, established within the Electronics Command structure at Fort Monmouth, N.J., has been of considerable help in the staffing of Army activities in meteorology. Several groups now operate as field stations of ASL in a coordinated effort.

Tropical/Arctic Meteorology. Specific research was initiated in the atmospheric characteristics in the tropics and arctic areas, and their relationship to Army operations—as part of broad Army programs in tropic and arctic environments. The Army thus became a leader in these studies within the Department of Defense.

Emphasis is focused on small-scale areas. The greatest contribution to new knowledge in the tropics has come from weather satellite observations. New techniques for forecasting weather conditions developed in the program have been used in Southeast Asia.

Meteorological Equipment. Army research has produced new knowledge leading to development of a Meteorological Data Sounding System (AN/UMQ–7) for collecting wind and air density information to about 100,000 feet. The equipment will be used by Army Artillery Meteorological Units to complete corrections for weapons systems.

A new Balloon Inflation and Launching Device (ML–594) is being service tested, and a Hydrogen Generator (ML–536) is under engineer tests. The generator is designed for economical production of hydrogen for inflating meteorological balloons. It uses a new technique for "cracking" fuel oil to produce hydrogen.

In advanced development is an improved fast-rise balloon (ML–566) that will take atmosphere sensors to 100,000 feet altitude more quickly.

A Mobile Weather Radar Set (AN/TPS–41) is being engineer tested. It is designed to detect and track natural and nuclear clouds and precipitation within a 150-mile radius, and also to provide isoecho contours of rainfall intensities.

A 17-pound Portable Weather Observing Pack (AN/TMQ–22) is being service tested for ability to provide accurate pressure, wind, temperature and moisture measurements under tactical conditions.

Meteorological Support. Specialized observations in Army tests have been provided by Army meteorological teams under arctic, tropical and desert environments.

Upper atmosphere measurements taken by meteorological rockets over a 2-year period in Panama were used primarily by the Army Corps of Engineers as part of the Atlantic/Pacific Intercontinental Canal Study. The purpose was to ascertain how the atmosphere would influence acoustic waves produced by high explosives used in excavating.

Data produced by this study have been useful in studying how the upper atmosphere will influence missile performance and detection characteristics.

Army meteorological support for the U.S. Air Force has included forecasting proper Athena lauching settings for unguided rockets fired

Natick Taste Test Saves Chow-Line Dollars

Taste makes waste, Army Natick (Mass.) Laboratories scientists claim.

Give a serviceman a food he doesn't like, they point out, and down the drain goes waste food and his morale—along with taxpayers' dollars.

As the nation's largest buyer of edibles, the Armed Forces constantly practice quality control from purchase point to consumer.

The Food Acceptance Group at Natick, headed by Loel Sidel, a psychologist, provides taste acceptability data on foods produced by new processes, such as freeze drying, or stored under field conditions.

Food samples submitted by prospective suppliers bidding on government contracts are extensively taste tested. Although a food may be wholesome and economical to buy, it may fall below acceptable taste levels, and many servicemen may not eat it.

The Acceptance Group has also participated in military-sponsored nationwide surveys of food preferences of men in the Armed Forces. Periodic studies results contribute to planning the yearly master menu for all Army and Air Force installations.

Foods for the Gemini Space Flights, all Natick developments, were tested extensively by the Acceptance Group prior to their adoption by the astronauts.

Subjects for the tests are selected at random by computer from a list of about 650 Natick civilian and military volunteers, representing varying social, economic, educational and age groups, comparable to a cross section in the U.S. Armed Forces. A test may involve from 30 to 40 consumers.

Each subject is given from one to five samples of a food. He indicates his degree of like or dislike on a card imprinted with the "Hedonic Scale," which shows gradations of acceptance from one (dislike extremely) to nine (like extremely). Results are compiled by computer into an average which shows how well a random selection of people liked the food.

Food is served at precise temperatures to insure that all taste testers receive identical samples and equal portions are served.

Natick's Acceptance Group also serves a research function by exploring new methods of acceptance testing to obtain more meaningful results.

Studies of environmental factors such as sights, sounds and odors are very important. Sidel said a consumer's degree of food acceptance may be influenced by these and other variables. Often a change of name for the same food will bring a different response.

Military research on testing methods provides the U.S. food industry with valuable data for conducting its own acceptance tests to determine which foods are most profitable to produce and market.

White Sands Missile Range Cuts ADP Operating Cost $1 Million

Operational cost savings of $1.1 million annually in use of automatic data processing systems has been announced by White Sands (N. Mex.) Missile Range Officials.

Outright purchase of two computers and eight units of related peripheral equipment formerly leased accounted for the economy. Seven White Sands personnel have been credited thus far in the development, preparation and coordination of documentation leading to the cost-reduction action.

They are Richmond M. Griffith, William A. McCool, Lloyd N. Hillen, Mrs. Anne H. Lester, Miss Abagail Rodriguez, all of the National Range Operations' Analysis and Computation Directorate; Edward J. Fields, National Range Engineering's System Development Directorate; and Kenneth O. Houston of Management Services.

Army activities are required to review the leasing of computer equipment periodically to determine if it is economically feasible to purchase.

Initially, nearly all computer hardware or systems used by the Army are leased as a cost-saving technique because of high purchase costs. As new equipment is acquired, it must be proven reliable as well as compatible with existing systems. Otherwise the lease is cancelled and the equipment returned to a vendor. The Army requires periodic review of purchase-versus-rental costs.

This action pushes White Sands' cost reduction efforts in management and use of automatic data processing systems to 734 percent of the goal assigned by the Army Test and Evaluation Command.

more than 400 miles from Green River, Utah, to impact on the White Sands (N. Mex.) Missile Range.

Real-time meteorological observations were used to adjust launching angles to allow for more than 140-mile variance in impact point from a "no wind" setting. As a result of these techniques, three unguided rockets can be fired safely at about the same cost as one rocket formerly.

Project HARP. For the past five years, the U.S. Army has been developing techniques for probing the upper atmosphere with gun-launched sensors. Under a joint U.S. Army-Canadian Department of Defense project, modified 16-inch naval gun tubes were used to fire about 150 instrumented rockets at Barbados, West Indies, and at Yuma (Ariz.) Proving Ground.

Wind direction and speed measurements were taken simultaneously with measurements of upper ionization intensities by sensors launched to elevations of more than 100 miles. Telemetry components were successfully hardened to withstand acceleration forces in excess of 30,000 g's.

The U.S. Army also made about 250 upper-atmospheric soundings with active and passive sensors launched from modified 5-inch and 7-inch gun tubes. A full-bore 7-inch gun-boosted rocket was developed for probing the upper atmosphere and is undergoing engineering tests.

Panama RDT&E Center. Recognizing the need for a center for research and testing of materials, equipment and operational techniques in the humid tropical environment, the U.S. Army established a Research and Development Office in Panama, Canal Zone, in 1962. Control was later transferred to the U.S. Army Test and Evaluation Command, Army Materiel Command, and it was redesignated the U.S. Army Tropic Test Center.

Considered a significant accomplishment was the establishment of a tropical environmental data base project to provide basic information on tropical forests to support activities of the USATTC and continental United States laboratories.

A U.S. Army Meteorological Team (RDT&E Support) was attached to the USATTC to provide support for projects conducted in the Canal Zone and surrounding areas. The team assumed responsibility Aug. 1, 1966, for operation of a national meteorological rocket network at Battery McKenzie in the Canal Zone.

Humid Tropic/Desert Research. A major inventory project of research activities and status of geographical knowledge of the world's humid tropics and desert environments resulted in publication of: "An Inventory of Geographical Research on Desert Environments" (1967); "An Inventory of Geographical Research of the Humid Tropic Environment" (1966).

These publications include information on physical features, flora and fauna, hydrology, weather and climate, coastal zones, and regional types. Major authorities and principal depositories are identified and gaps in knowledge and research required to fill the gaps are highlighted.

Army R&D Office-Alaska. Established July 14, 1961, the U.S. Army Research and Development Office-Alaska was phased out in 1967. During the six years of its existence, first under the Office of the Chief of Research and Development and later under the U.S. Army Materiel Command, this organization performed valuable liaison and support functions between the Army and other organizations involved in Alaskan R&D.

Polar R&D Program. For 9 of the past 10 years, the U.S. Army conducted a Polar R&D Program in Greenland in response to recommendations of the National Security Council as approved by the President. During the peak of activities, operations included the use of approximately 600 men per field season. Objectives of the program were not achieved fully and the program was terminated in 1967.

Findings resulted in some improvement of the capability of the Army for logistically supporting operations in perennially snow- and ice-covered areas, as well as an increased capability for operating in the less-rigorous areas of the cold regions.

These capabilities include construction of surface and subsurface camps, water supply and sewerage systems, compacted snow runways and roads, and operation of over-snow cargo and personnel vehicles.

Establishment of CRREL. The Cold Regions Research and Engineering Laboratory was created in 1961 by combining the Army Construction and Frost Effects Laboratory and the Snow, Ice and Permafrost Research Establishment.

CRREL has conducted investigations in Greenland, Antarctica, Canada, Alaska, India and the northern areas of the U.S. Operations have substantially increased fundamental knowledge of these regions, resulted in considerable practical application of findings, and produced about 450 published reports.

Climatic Extremes for RDT&E. Design criteria for Operation of Materiel Under Extreme Conditions of Environment were set forth in Section II of Army Regulation 705–14, published Aug. 14, 1957, and revised in 1962 and 1963. A third revision, titled "Climatic Design Criteria," currently is being staffed

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DoD Studying College Grad Draftee Problem

Methods of utilizing most effectively within the Armed Forces 140,000 to 180,000 college graduates who may be inducted into military service during FY 1969 are being studied by the Department of Defense.

The dramatic step-up in inductions of college graduates resulting from 1967 changes in the Selective Service Act is raising many questions regarding how maximum benefit can be obtained from this abundance of professional and technical talent. Each of the services is examing its utilization policies in consideration of this problem.

Assistant Secretary of Defense (Manpower and Reserve Affairs) Alfred B. Fitt recently ordered the formation of an interservice working group. The study is being directed by Keene Peterson, DoD Directorate of Utilization and Management Techniques.

The initial phase of the committee's effort is scheduled to be completed this month. Studies of each Service's experience in utilizing college graduates will be transmitted to the Army, Navy and Air Force secretaries for approval. Analysis of these studies by the interservice working group will follow. The final report is due in June.

One of the longer-range objectives is that of placing as many graduates as possible in assignments related closely to their professional backgrounds, with an emphasis upon possible military career opportunities. Frequently, however, to meet current military requirements, it will be necessary to utilize their potential for special training.

Insofar as the possible impact of the new utilization policies upon the Army Science and Engineering Program is concerned, the present DoD expectation is that the greatest change will be in overall quality rather than in any dramatic increase in quantity of men selected.

The expectation is that a significant number of enlisted men with master's or PhD degrees in scientific and engineering disciplines may become available for assignment to the Science and Engineering Program, thus strengthening the program by improving the quality of participants.

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for publication in the first quarter of FY 1969.

Recognized in the latest changes are five climatic conditions (hot-dry, warm-wet, intermediate, cold and extreme cold) rather than the three categories of previous versions. Distribution of these climatic conditions will be shown on a map.

Another proposed change is revision of the critical temperature for cold conditions, −50° F. for cold and −80° F. for extreme cold in place of the previous single −65° F. for cold conditions.

Environmental Influence. Research on the influence of environmental conditions on men and materiel in the humid tropics has been a continuing Army project. During the wet season of 1962, a project called Swamp Fox was conducted in the Republic of Panama, involving a scientific team evaluation of vehicle performance under varying test-course conditions.

Results proved that use of aggressive-treaded, wide-base tires improved off-road mobility; however, performance of tracked vehicles was superior to that of wheeled vehicles in this environment. Supplemental studies were made in the El Real area of eastern Panama to provide information on a broader range of conditions than in the Swamp Fox tests.

Mapping and Geodesy. The Research Institute for Geodetic Sciences (RIGS) was established in 1965 as a part of the U.S. Army Engineer Topographic Laboratories (USAETL), formerly the Geodesy, Intelligence, Mapping, Research and Development Agency (GIMRADA), at Fort Belvoir, Va.

The RIGS has shown signs during its brief period of operation of developing into a mapping and geodetic organization of national stature. The older subdivision of USAETL has achieved important results during this period, including development of the Universal Automatic Map Compilation Equipment (UNAMACE), a machine that automatically produces a contour map from aerial photographs.

BEHAVIORAL SCIENCES. This division evolved in March 1967 as an outgrowth of the Human Factors and Operations Research Division, which was disestablished at that time. The Behavioral Sciences Division (BESD) is assigned primary responsibility for General Staff supervision of, or Department of the Army participation in, personnel and training research. Lt Col Charles E. Ramsburg is chief.

Research activities are aimed at improving the Army's personnel program, development of nonsystems devices and simulators to facilitate training, studies for man-machine compatibility design, and basic and applied investigations in the behavioral and social sciences.

A Social Sciences Branch was established in 1961 as a part of the former Human Factors Division, and was assigned responsibility for supervision of research in the human factors and behavioral sciences area. The branch has survived through successive realignments and presently consists of seven people, with Dr. Kenneth E. Karcher Jr. as chief.

The Human Factors Branch is headed by Lt Col Gordon E. Conklin. The Military Advisers Branch consists of Maj Fred C. Berry Jr., assigned to the Center for Research in Social Systems of American University; Lt Col James F. Culp, assigned to the Human Resources Research Office of George Washington University; Lt Col Johnny J. Churchill, assigned to the Army Research Unit in Korea; and Lt Col Joseph T. Tambe, adviser to the chief.

Growth of the Social Sciences Branch in recent years reflects the Army concern with research required to support U.S. Army operations in the developing nations and remote areas through improved social science and cultural information. Involved are civic action, psychological operations, military assistance to indigenous forces, and the complex of military-political factors associated with insurgent and guerrilla warfare.

Underlying all of these military activities are the cross-cultural problems of operating effectively in non-Western countries. The Army Research Unit in Korea began operations in January 1964 with the support of the Eighth United States Army. This unit has provided an overseas "laboratory" in which to conduct social science research.

In addition to dealing with problems in U.S. Adviser-Counterpart relationships, the unit's most publicized activity has been in the area of Troop Community Relations. Conducted by the American Institutes for Research, this program has resulted in the introduction of orientation procedures throughout the Eighth United States Army.

The Center for Research in Social Systems represents the largest single contract effort monitored by the Social Sciences Branch. CRESS responds to a wide variety of research requirements from the Department of the Army staff and major overseas commands. Case-book studies of revolutionary and guerrilla warfare are used by Army service schools, and recent studies of the Viet Cong infrastructure have attracted wide attention.

Cultural studies by CRESS with

3,500 Slated for Fort Lee LOGEX-68 'War on Paper'

Escalated "war on paper," incorporating new logistic concepts and involving about 3,500 participants, will be waged May 3–10 at Fort Lee, Va., during LOGEX–68, the Army's largest annual practical exercise in troop support.

First Army CG (Lt Gen) Jonathan O. Seaman will be exercise director, assisted by Maj Gen Victor J. MacLaughlin, CG of the Army Quartermaster Center and Fort Lee. Col Paul R. Jeffrey, commander of the 22nd Field Army Support Command (FASCOM), is the exercise maneuver director.

Some 500 individual Army Reservists and about 1,000 members of 25 Reserve units from Washington, D.C. to Seattle, Wash., more than 1,500 Army service school representatives, and 400 Navy and Air Force personnel will join FASCOM for the exercise. Pre-play orientation begins about Apr. 27.

Administrative Support to the Theater Army (TASTA–70), a concept prepared by the U.S. Army Combat Developments Command, Fort Belvoir, Va., and developed by the USACDC Service Support Group, Fort Lee, will be employed.

Among the up-to-the-minute combat service support features of TASTA–70 is the integration of both combat and communications zones of a theater with the base of resources in the Continental U.S. Under TASTA, many shipments of supplies go directly to a user, bypassing one or more support elements. It also employs increased automatic data processing equipment to identify supply problems for "quick action."

For LOGEX–68, 19th year of logistic gaming, the war zone still is in Germany but the communications zone has been extended from France to the Benelux countries (Belgium, the Netherlands and Luxembourg) and to England.

The LOGEX scenario calls for increased communications, including some 1,600 telephonic installations, about 25 percent above normal LOGEX use.

Previously billeted in tents, LOGEX–68 participants will use 173 Fort Lee buildings as quarters and for LOGEX play and administration.

specific military relevance have become basic Army documents in psychological operations programs. Current programs reflect the broadened Army concepts of civic action and civil affairs.

In 1964, the Department of Defense directed establishment of the Cultural Information Analysis Center as a major element of CRESS. This information storage and retrieval activity responds to hundreds of questions and inquiries each year from many governmental agencies on specific aspects of operations in developing areas of the world.

The Director of Defense Research and Engineering approved, in February 1966, a long-range planning document prepared by the Social Sciences Branch and submitted as an approved Army plan. More than 70 major research areas or programs are identified in this document. Priorities undoubtedly will shift, but the plan indicates the major emphasis of the Social Sciences Branch for years into the future.

Within the plan, research proposals to investigate selection, training and assignment problems associated with U.S. Army personnel in developing nations, and particularly in the advisory functions, are considered the most critical area.

The Social Sciences Branch is thus faced with complex cross-cultural problems no less difficult to solve than those associated with intercultural communication, assessment of civic action, and analysis of the social-political and military dynamics of unconventional warfare.

The BESD has monitored an expanding program of research in the psychological and social sciences, resulting in better instructional methods and shorter training programs at reduced cost.

One such development now in full use by Army schools is the "functional context principle" of instruction. It includes a method of arranging course material in sequence from concrete to abstract, whole to part, and operational to theoretical. This reverses the former order of presentation.

The leadership instruction course, highly praised by teachers and students in the senior college ROTC program, was developed under the functional context principle of instruction.

Other Army training programs benefiting directly from human factors research are those for basic combat, NCO leadership, helicopter pilots, aerial observation, land navigation, Women's Army Corps, armor crewmen, armor commanders, air defense, and electronic maintenance—to name but a few.

The Human Resources Research Office study on the question of predicting human behavior in nuclear warfare has been widely accepted as a unique "classic" on the subject. Results of other HumRRO research are used extensively by Army training elements and combat developments agencies.

Other agencies recognize the merits of U.S. Army research on training motivation and leadership. The U.S. Navy, U.S. Marines, U.S. Air Force, U.S. Department of Health, Education and Welfare, Martin Aircraft Co., University of Maryland, and the Canadian Defence Establishment are representative of agencies known to have used knowledge gained from the program.

The U.S. Army Behavioral Science Research Laboratory (BESRL) program is under the monitorship of the USARO Behavioral Sciences Division. BESRL, redesignated a number of times in its rather lengthy history, became a Class II activity under the Chief of Research and Development in 1961.

BESRL produced the well-known Army Classification Battery (ACB), regarded as a true landmark in Army personnel classification procedures responsible for improved management of manpower resources. BESRL continues to lead in development of psychological testing technology and application to military problems. More than 100 tests used by the Army today are BESRL products.

Other BESRL research has made major contributions to electronic intelligence processing. Current effort is breaking new ground in application of operations research techniques and modeling to personnel management problems. BESRL personnel management models have been used also by the Department of Defense.

Human factors applications in design and development of materiel have been under extensive study within the behavioral science research program for many years. Results of several formal studies have found their way into the Report by the Department of the Army Board of Inquiry on the Army Logististics System, providing the basis for recommendations approved for action by the Chief of Staff.

A new Army Regulation, 602–1, Army Human Factors Engineering Program, will soon be published as a direct outgrowth of this overall effort.

STUDIES AND ANALYSIS. Formed Mar. 29, 1967, as one of three successor divisions to the Army Human Factors and Operations Research Division, the Studies and Analysis Division is headed by Col Russell D. McGovern. Lt Col William S. Vargovick is chief of the Military Advisers Branch. Lt Col William H. Travis is chief of the Studies Branch.

The division was organized in response to increasing awareness of the necessity for specialists and for specific structures to supervise application of operations research (OR) techniques in the Army Study Program. The division is staffed with nine officers who have had formal operations research training.

Responsibility for monitoring the studies and analysis element of RDT&E programs at General Staff level is assigned to the division. It assists in negotiating study contracts, performs liaison between study sponsors and contractors, and provides the

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Vinyl Coating Proving Versatile for Army Needs

A modified vinyl-type coating for use as a camouflage and solar-reflecting coating on neoprene and rubber type substrates has been developed by the U.S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.

In laboratory and field tests, the coating showed excellent adhesion, oil and fuel resistance, and exceptional resistance to water swell and weathering. High abrasion resistance, good color retention and flexibility are other features that make the coating highly versatile. When the coating is applied by brush, the dry film cannot be distinguished from that applied by spray.

The material also has been modified as an antifouling coating for rubber pontoons. Reports after seven months of testing in Vietnam indicate that it has excellent service characteristics and good solar reflection properties.

The Army's Natick (Mass.) Laboratories are evaluating waterproofing and abrasion properties of the coating as an impregnant on canvas and cotton duck.

Other uses contemplated for the coating are pattern paint for camouflage of rubber items, camouflage and solar-reflecting coating for collapsible fuel tanks (to cut down fuel evaporation), radomes, abrasion- and fuel-resistant coating for hose and wire, and high visible color coatings for rubber life rafts.

The coating was developed by the Organic Research Team of the Materials Research Support Division, Military Technology Laboratory, Mobility Equipment R&D Center.

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single official Army contact point with the Research Analysis Corp. (RAC), an Army contract agency.

The division organizes and supervises Project Advisory Groups (PAG) for studies under contract with the Office of the Chief of Research and Development (OCRD) and performs technical review and analysis of resulting reports. The OR specialists in the division are available within OCRD elements for advice on application of OR techniques to studies of any type.

The FY 1969 Army-wide OR Study Program, including studies in support of the Department of the Army staff, is being developed by the division. Studies will provide much of the conceptual framework upon which will be formulated the military strategy, organizational structure and materiel for the Army of the future.

Solicited study proposals from the Department of the Army staff will be screened by the division for appropriateness in developing a program to submit to the Army Study Advisory Committee for further evaluation. The ASAC recommends the final program to the Chief of Research and Development, who approves it for implementation of study contracts by the SA Division.

Both branches of the division are engaged in supervision of the RAC program throughout the work year, through liaison, correspondence and the PAG military advisers. The Studies Branch develops the budget element and supporting data for justification, and also supervises preparation of the RAC program and negotiation of the contract.

A member of the Military Advisers Branch sits with each RAC study PAG, advising members as to their responsibilities and limitations. He also processes RAC documents and reports for clearance and publication.

S&TI DIVISION. In the March 1963 U.S. Army Research Office organizational realignment, the Scientific and Technical Information Division became successor to the Research Support Division, the last of the original divisions created in 1958.

Division Chief Col Dale L. Vincent functions also as Director of Army Technical Information, as project director for the Army R&D Information System (ARDIS), and as Army contact point for the Data Systems functional area of the Department of Defense Data and Standardization Program set up by DoD Instruction 5010.13. M. H. Weik Jr. is his deputy.

Functions of the division include General Staff responsibility for monitoring and supervising the Army Scientific and Technical Information Program, including ARDIS, and providing the principal advice in this area in support of top management decisions on Army R&D programs. The division is charged with coordination of scientific meetings (such as the Army Science Conference, Army Junior Science and Humanities Symposia Program, International Science Fair) and supports for the Army a number of national and international professional organization conferences.

Coordination of various technical publications, including staffing of the *Army Research and Development Newsmagazine*, is another function.

The division consists of four branches: Programs and Concepts, Dr. John C. Hayes, chief; Systems and Analysis, Morton H. Marks, chief; Publications, Clarence T. Smith, chief; and Automated Data Processing Support, Walter L. Galson, chief.

Organized into a coordinated and integrated system of major developmental projects, the Army S&TI Program is correlated with the Department of Defense S&TI program and the efforts of a number of major U.S. Government agencies to develop systems linked to a national network.

Among objectives of the division is that of developing exploratory (experimental) chemical data, engineering data and other specialized information systems that will make needed available knowledge in all areas of Army R&D effort readily accessible to top management and to scientists, engineers and supervisors for R&D program improvement.

Since October 1962, when an ad hoc study group representative of major Army agencies was convened at the Army Research Office to implement an order of the Chief of Research and Development, the S&TI Division has had a major role in establishing the overall Army effort as a pattern for the DoD program.

The division has developed such exploratory systems as CIDS (Chemical Information Data System), EDIS (Engineering Data Information System), IDEEA (Information Data Exchange Experimental Activities), ATLIS (Army Technical Library Information System), TIFA (Technical Information Functions and Activities), and STCS (Scientific and Technical Conferences and Symposia). TIFA embraces two major efforts, ARDIS (Army R&D Information System) and TIACS (Technical Information Analysis Centers System).

Many of these systems have now reached the advanced exploratory development stage, including the establishment of experimental operational facilities and equipment. The CIDS network for automated collection, processing, retrieval and dissemination of chemical information and data is scheduled for test operation at an early date.

Priority emphasis is currently upon the ARDIS project, by direction of the Army Chief of Staff, to provide essential management information.

RESEARCH PROGRAMS. Until the USARO reorganization in March 1963, the functions now assigned to the Research Programs Office, established at that time, were performed by the Research Support Division.

Among these functions are programing, budget justification, financial management, budget execution, developing policy and procedures for Army grants, and procuring research by execution of contracts and grants.

Col Albert E. Joy is chief of the

DDC Increases 20 Percent In Distribution to Agencies

The Defense Documentation Center (DDC) provided 1,957,797 copies of technical reports to the federal research and development community during 1967, a 20 percent increase over 1966.

DDC is the central facility of the Department of Defense for secondary distribution of scientific and technical reports generated by Defense-funded R&D efforts. It also operates computer-based data banks of management and technical information, and is responsible for development of information storage-and-retrieval systems.

The addition of 51,688 technical reports to the collection during the year brought the total of documents in the DDC collection to 852,696. These reports cover all areas of science and technology. DDC also provided 21,710 bibliographies, an increase of 17 percent over the 1966 workload.

Requests for information from the DD Form 1498 (Research and Technology Work Unit) system of reporting ongoing work in Army laboratories, amounted to 4,209, more than double the 1966 workload. At the end of the year, the computerized data bank contained 34,569 descriptions of current DoD and NASA efforts in research and exploratory development.

DDC services are available without charge to DoD and other federal activities, their contractors, subcontractors and grantees.

office in addition to his duties as executive to the Assistant Director of Army Research, Col William J. Lynch. Earl Shepard is the newly appointed chief of the Research Programs Branch and Hilbert E. Friend, one of the early employes of USARO, is chief of Contracts and Grants.

During the formative phase of USARO, the annual budget administered by the Research Programs Branch amounted to approximately $6 million, as compared to $205 million for FY 1967. Additional contracts and grants are awarded through the Army Research Office-Durham, N.C., accounting for a relatively small percentage of the total funding.

The grants program, designed to support basic research in Army areas of interest at academic institutions and in nonprofit research organizations, has shown a similar growth.

In 1960, the Research Contracts and Grants Branch administered four contracts and four grants in the Continental United States, with a total dollar value of $7,500,000. In FY 1967, 170 contracts and 50 grants, with a total value of $80 million, were distributed in the Continental U.S., Canada, Latin America, Australia and Africa.

RESEARCH PLANS. Established as a part of the 1963 USARO organizational realignment, the Research Plans Office functions in close cooperation with The Army Research Council (TARC). TARC was established in January 1964 by direction of the Assistant Secretary of the Army (R&D) as a study group of 10 senior scientists, representing major disciplinary areas.

Staffed with three lieutenant colonels and a civilian scientist, the office is headed by Lt Col Robert H. Hurst. Its function is to develop long-range plans to meet envisioned future objectives.

Army Research Plan (*ARP*). A revised Army Research Plan was published Dec. 15, 1967, providing guidance to developing agencies for Army research and exploratory development efforts in support of operational objectives developed within the Army.

The ARP utilizes the TARC Report of 1966 as a major input for making appraisals of ongoing programs. Research strategy developed within this plan represents the corporate judgment of the Office of the Chief of Research and Development, and the directors of Research, Plans and Programs, Developments, and Missiles and Space (the four directorates of OCRD).

Project THEMIS. The Army Research Office provides Army representation to the Department of Defense Project THEMIS Committee, composed of the three military services, Advanced Research Projects Agency (ARPA) and the Office of the Director of Defense Research and Engineering (ODDR&E).

This project is a DoD program, instituted by direction of the President, to develop new academic centers of excellence in science and technology in civilian universities and colleges. THEMIS will expand to approximately 200 programs over a 4-year period and the Army's share is expected to be about 50 programs.

Technological Forecast. Prior to initiation of the current series of Army Long-Range Technological Forecast documents, technological forecasting was accomplished within the Army by the seven Technical Services, each of which prepared a separate document.

With the reorganization of the Army in 1962, a single Army Long-Range Technological Forecast document was prepared under staff supervision of the Office of the Chief of Research and Development by the U.S. Army Materiel Command. This document is currently in its fourth edition and consists of three volumes.

OPERATIONS RESEARCH GROUP. The U.S. Army R&D Operations Research Advisory Group (CRDORA) is the smallest organizational element of the U.S. Army Research Office and is responsible directly to the Director of Army Research. It consists of Col Charles E. Preble Jr. as senior military adviser and Maj Paul P. Winkle Jr.

Stationed at the Research Analysis Corp. (RAC) main office building in McLean, Va., this group performs a liaison and advisory function between RAC Management and elements of the Office of the Chief of Research and Development, Department of the Army. It also serves other U.S. Government agencies sponsoring RAC operations research/systems analysis studies. RAC is the Army's major contract agency in the operations research/systems analysis field.

COSATI Forms Task Group On Technology Utilization

A task group on Technology Utilization, under chairmanship of George J. Howick, director of the Technology Utilization Division, NASA, has recently been formed by the Committee on Scientific and Technical Information (COSATI).

The group will study problems and developments and recommend policies on technology transfer within the Federal Government and between the Federal Government and organizations in the private sector.

Project Mallard Marks First Year of Progress

Project Mallard planners on Apr. 6 marked the first anniversary of the 10-year multimillion-dollar program to develop an international communications network for the United States, United Kingdom, Canada and Australia. Twenty-six contracts have been awarded in the four nations.

Eleven firms are involved in the contract awards to date. Two systems studies in the United States and a third in the United Kingdom represent the largest expenditures. Plans call for more than $100 million funding for research and development effort.

The system design phase of the project, scheduled to continue into 1969, will be followed by the building of functional models of equipment and simulation trials to prove feasibility. Refined models will then be built and subjected to rigorous service tests. Equipment will be delivered to military users of the four nations in the 1975–77 period.

Although the focus of Mallard planning was directed toward the future communication needs of Army forces at the outset, Navy and Air Force elements of the four nations have become active participants, as has the U.S. Marine Corps. Mallard interfaces will link it with global strategic communication nets.

Maj Gen Paul A. Feyereisen is the top United States official involved. Along with his job of U.S. program-project manager for Mallard, he is deputy commanding general for Tactical Communications Systems in Fort Monmouth's Army Electronics Command. ECOM is headed by Maj Gen William B. Latta.

"Although Mallard is still in the early stages, we are very pleased with the progress made during the first year," General Feyereisen said. "I am sure that the other program managers for the United Kingdom, Canada and Australia share this appraisal.

"The most significant feature of Mallard is that we are not building a group of communications systems. We are designing a single, total system that will provide a secure, highly reliable fully automatic means for transmitting and receiving information, including voice, data, telegraph and facsimile—at the same time using state-of-the-art technology to reduce size, weight and reaction time.

"The four Mallard participants have a common aim—creation of a system that will provide a new dimension in military communications, and greater security in our mutual defense."

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'Sentimental Journey' for [illegible]

Garand Returns for Springfield Armory Phaseout

In accordance with phase-out instructions issued by the Department of Defense in November 1964, Springfield (Mass.) Armory will close its doors Apr. 30 as the "dean" of all U.S. Army arsenals—174 years and 28 days after it was founded by act of the United States Congress.

Springfield Armory's illustrious role in development of U.S. weaponry earned enduring memory when it was designated Apr. 3, 1963, as a Registered National Historic Landmark. In that year, emphasis at the Armory shifted heavily to R&D, engineering, procurement and pilot production of new armament systems for helicopters and fixed-wing aircraft.

General George Washington, upon recommendation of his most experienced Artillery officer, General Henry Knox, selected Springfield as the site for a "laboratory." Following the Revolutionary War, all manufacture and repair work was stopped, but Springfield remained as an ammunition storage depot for the New England area.

In 1879, Washington recommended that Springfield be designated a National Armory. In World War I, a peak of 5,381 employes was reached. During World War II, more than 4,000,000 Garand rifles were produced, with a peak of 14,000 workers.

★ ★ ★

With energetic steps belying his 81 years of age, the trim and wiry world-renowned inventor bounded up the main staircase of the Springfield (Mass.) Armory Administration building.

In the office of the installation commanding officer, Lt Col Charles B. Zumwalt, he was warmly greeted with the words: "Welcome to the Springfield Armory, John C. Garand."

One of this nation's outstanding weapons designers, known to millions of American and European military men, had returned to the scene of his greatest triumphs. The visit was a sentimental one—a return to Springfield Armory prior to its final phaseout by Apr. 30.

Before the day was over, he was to be affectionately approached by most of some 400 remaining employes currently engaged in phase-down activities. His hand was eagerly sought and pumped as a reminder of old friendships, and he was engaged in conversations relating to days of success for himself and Springfield Armory.

Mr. Garand was escorted to such points as the former site of his office; his working haunts in the Model Shop of the Research and Engineering Division; the metal-cutting areas where the M1, the "Garand Rifle," evolved; and to the Test Branch where early test models were put through their paces.

The visitor observed the changes wrought by time since his retirement from Springfield Armory. His former office space was now a classroom of the Springfield Technical Institute. The Watershops area also presented

SPRINGFIELD ARMORY inventor of the M1 rifle, John C. Garand, 81, reminisces on highlights of the armory's 174-year history with Commanding Officer Lt Col Charles B. Zumwalt. Mr. Garand made a final "sentimental tour" prior to phase-out of the armory.

a study in contrasts. Where once huge machines made metal chips fly in the manufacture of the M1, and the air was filled with the booming sound of production, now only the sound of cars on Walnut Street and the voices of men at work loading trucks could be heard.

The final stop at the Test Branch brought home to the visitor the extent to which the Springfield Armory had ceased to contribute to the national defense effort as a result of the phaseout implementation.

Firing ranges were dark and silent. Where once weapons of all types had been subjected to various examinations and evaluations for proof of their meeting of Springfield Armory standards of dependability and ruggedness, there were now only closed doors and inactivity.

The vitality of an art in weapons craftsmanship, initiated and nurtured at Springfield Armory since 1794, had ceased to exist.

Elliott Anderson, acting head of the Armory Test Branch and a current Springfield Police Commissioner, greeted him upon his arrival at Test Branch facilities and reintroduced him to the few remaining personnel, many of whom had nursed the M1 rifle through its initial stages of development.

Highlight of the Test Branch visit was a brief burst of the M61 20mm air-cannon, now mounted on sleek Air Force jets, and its companion the 7.62mm "Mini-Gun." Mr. Garand also [illegible] an opportunity to view a short "time-lapse" movie which brought down into slow-motion sequences the inner movements of such modern-day Springfield Armory developments as the M14 rifle, the M73 and M85 machineguns and the latest in aircraft armament.

The 5-hour tour was a spontaneous tribute on the part of Springfield Armory staff personnel and all employes for the role played by Dr. Garand in its illustrious history. He had served his country with unusual distinction and unselfishness over a period of 34 years, ending with his retirement in 1953. An inventive engineering genius, his talent led to personal praise from Generals Dwight D. Eisenhower, Douglas MacArthur, George Patton and many other internationally known military personnel.

His inventiveness along many lines resulted in a total of 56 patents and while he retained certain civilian rights to many, he always ignored the chance to profit from use of his patent.

On Mar. 24, 1944, Secretary of State Cordell Hull presented him with the first civilian Medal of Honor. In 1945, he became the first Armory employe to be granted a special increase in pay and promotion under authority granted by a Special Act of Congress.

Numerous other honors were accorded him including the Lord and Taylor design award; a special award from the American Society of Metals; the Rice Medal from the American Ordnance Association; the John Scott Medal from the City of Philadelphia; the Holley Medal from the American Society of Mechanical Engineers; the Pynchon Medal from the Advertising Club of Springfield; a medal from the Franco-American Historical Society; an honorary degree from Lehigh University; and the dedication of the John C. Garand Bridge at Griswold, Conn.

This month, John C. Garand will reach his 82d birthday. The years have been kind to him physically. Still agile and possessing quick reflexes, he continues his interest in weapons and all the other "hardware" by combining an inquiring mind, a steady hand and an intuitive knowledge into the production of end items.

As he so succinctly said to his Springfield Armory friends: "My best advice to everyone faced with retirement is not to really retire at all. Keep busy . . . by keeping busy you will also be keeping happy."

John C. Garand today, as in the past, continues to put his finger squarely upon the problem—whether it be developing a weapon or developing a philosophy of life.

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